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Submitted to:

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Forest Hills, NY 11375

REMEDIAL INVESTIGATION WORK PLAN

West 61st Street Site

New York, New York

Project Number: 10321
BCP ID 231043

April 2005

REMEDIAL INVESTIGATION WORK PLAN

WEST 61ST STREET SITE

New York, New York

AKRF Project Number: 10321
BCP ID 231043

Prepared by:

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APRIL 2005

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April 21, 2005

Shaminder Chawla
NYS Department of Environmental Conservation
1 Hunters Point Plaza
47-40 21st Street
Long Island City, New York 11101-5407

Re: Remedial Investigation Work Plan
West 61st Street Site - New York, New York
AKRF Project Number 10321
BCP ID C231043

Dear Mr. Chawla:

AKRF, Inc. is pleased to submit this Remedial Investigation Work Plan for your review and approval under the New York State Department of Environmental Conservation Brownfield Cleanup Program. The Work Plan is on based on the findings and recommendations from the Phase I Environmental Site Assessment prepared by AKRF, Inc. dated June 4, 2003, and a subsequent site inspection conducted on March 22, 2005. If you have any questions or comments regarding the enclosed report, please do not hesitate to contact me at 646-388-9527.

Sincerely,
AKRF, Inc.

Michelle Lapin, P.E.
Senior Vice President

cc: Bennet Schonfeld – Algin Management Co., LLC
David Freeman, Jesse Hiney – Paul, Hastings, Janofsky & Walker, LP
Benjamin Conlon – NYS DEC Environmental Enforcement (re: case 2-350028)
Stephanie Selmer - NYSDOH

Enc.

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1.0 INTRODUCTION

The West 61st Street Site (the project site or site) consists of approximately 62,500 square feet located on West 60th and 61st Streets between West End Avenue and Amsterdam Avenue in Manhattan, New York (Figure 1). Specifically, the study site consists of Block 1152, Lots 5, 8, 10, 11, 12, 13, part of 43, 52, 53, and 55 (Figure 2). These parcels are currently occupied by vacant land, used for outdoor storage or parking lots, or occupied by buildings undergoing and scheduled for demolition. Residential, industrial, institutional (school) and commercial properties are present in the surrounding neighborhood.

A Phase I Environmental Site Assessment performed by AKRF, Inc. (AKRF) in June 2003 identified recognized environmental concerns for the site, including former and current land use and potential underground storage tanks. This Remedial Investigation Work Plan (RIWP) provides a scope of work for conducting a geophysical survey to determine the presence of underground storage tanks and a subsurface investigation to characterize soil in areas of proposed excavation. The Health and Safety Plan (HASP) (Appendix A) includes measures to protect on-site personnel and the public from potential contaminants of concern during the implementation of the RIWP.

In October 2004, West 60th Street Associates, LLC, and West End Enterprises, LLC (the Volunteer), submitted an application to participate in the New York State Department of Environmental Conservation (NYS DEC) Brownfield Cleanup Program. The Brownfield Cleanup Agreement for the site was signed by the Volunteer in March 2005 and subsequently executed by the NYS DEC. As required under the BCP, before NYS DEC approves the RIWP, the Volunteer will provide the site contact list with a Fact Sheet describing the proposed plan, and a 30-day public comment period will commence. In addition, the draft RIWP and the Fact Sheet will be made available in the document repository at the following locations:

New York Public Library - Riverside Branch
127 Amsterdam Avenue
New York, NY 10023-6447
(212) 870-1810
Monday: 10:00AM-6:00PM
Wednesday: 12:00PM-8:00PM
Thursday: 1:00PM-8:00PM
Friday: 1:00PM-6:00PM
Saturday: 10:00AM-5:00PM

NYS DEC
One Hunters Point Plaza
47-40 21st Street
Long Island City, NY 11101
(718) 482-4897
9:00AM-3:00PM by appointment only

1.1 Site Characterization

The surface topography at the study site slopes downward to the west towards the Hudson River. Based on a geotechnical report prepared by RA Consultants, the property lies at an elevation of approximately 51 feet at its highest point, sloping west to an elevation of approximately 32 feet at its lowest point, Borough of Manhattan Datum. The geotechnical engineering borings indicated the bedrock surface is variable and ranges from elevation 40.8 feet in the northeastern corner to elevation 0 feet in the northwestern corner. Depth to bedrock varies from 10.5 feet to 45 feet below ground surface. The geotechnical investigation identified that the bedrock appears to undulate as well as slope.

The geotechnical report identified groundwater at a depth of approximately 13 to 17 feet below grade; or an elevation of 25 to 30 feet. Groundwater likely flows in a westerly direction toward the Hudson River, located approximately 500 feet west of the study site. However, actual groundwater flow at the site can be affected by many factors, including current and past pumping of groundwater; past filling activities; underground utilities and other subsurface openings or obstructions such as basements or underground parking garages; bedrock geology; and other factors. Groundwater in New York County is not used as a source of potable water.

1.2 Proposed Development

The proposed development is shown on Figure 3. The proposed project includes the construction of three new buildings that would include parking and mechanical spaces at the cellar and subcellar levels; retail and community use on the first floor, and residential space (rental and condominium) from the second floor up. Building A will be 9 floors, Building B will be 14 floors, and Building C will be 29 floors. The proposed project currently consists of excavation of all developed portions of the site to the bedrock surface, which varies from a depth of 10.5 to 40 feet below grade. The two undeveloped portions totaling approximately 23,000 square feet is not anticipated to be disturbed as part of general construction, other than landscaping. The excavation area will be sheeted along the perimeter.

1.3 Site History

The regulatory databases, Fire Department records, electronic Buildings Department records, historical land-use maps, and visual inspections indicated that the subject block was developed prior to 1907 as residential, transitioned from primarily residential to commercial and industrial uses by the 1950s, and has remained commercial and industrial through the present. During the June 2003 Phase I Environmental Site Assessment site inspection, buildings were present on seven of the 10 site lots. Since that time, the site buildings were demolished or are in the process of being demolished. The concrete basement (or first floor if building had no basement) slabs were reportedly left in-place and the site was graded with on-site construction and demolition debris to match the surrounding ground surface elevation. The aboveground storage tanks were closed and disposed of off-site prior to the demolition; documentation of proper disposal will be provided as part of the Remedial Investigation Report.

1.4 Previous Environmental Investigations

A Phase I Environmental Site Assessment (ESA) was performed by AKRF on the project site in June 2003. The ESA report included the findings of a site inspection, the evaluation of available historical information, and the interpretation of relevant federal and state environmental databases. The pertinent findings of the June 2003 report are summarized below:

Block 1152, Lot 5: At the time of the Phase I ESA site inspection, Lot 5 was occupied by a two-story (with partial basement) brick taxi garage built prior to 1926. Historically, this parcel was occupied by three, four-story store-fronted dwellings (c. 1907). The 1926 historical map for this parcel showed one 550-gallon gasoline underground storage tank (UST), however, site interviews indicated that no gasoline tanks were in-use on-site at the time of the Phase I ESA. During the site walk, a 1,080-gallon fuel oil concrete-vaulted aboveground storage tank (AST) was observed in the basement. According to electronic Buildings Department records, this AST was likely installed in 1940 and was permitted by the Fire Department until 2003.

Three additional ASTs were observed during the site visit on the first floor, including: one 275-gallon waste oil tank, one 275-gallon transmission fluid tank, and one 275-gallon lube oil tank. Other observed on-site oils and chemicals included: one 55-gallon drum of motor oil; two 55-gallon drums of anti-freeze; two 55-gallon drums of transmission fluid; seven hydraulic car lifts with above ground hydraulic oil canisters; five 35-gallon containers of gear oil; and paints used in a spray paint booth. This facility was listed in the regulatory database as an Air Discharge Facility for the potential release of chlorofluorocarbons; the compliance status for this air discharge permit was unknown.

Block 1152, Lot 8: At the time of the Phase I ESA site inspection, Lot 8 was occupied by a four-story (with basement) brick building built in 1919 that was partially vacant. Historically, this parcel was occupied by two four-story residential buildings (c. 1907). The 1926 map indicated that the building contained one 550-gallon gasoline UST, however, site interviews indicated that no gas tanks were in-use on-site. Electronic Buildings Department records indicated that two permits were applied for; one in 1940 for the installation of a gasoline tank and one in 1961 for a fuel oil burner permit. During the site visit, one 1,050-gallon fuel oil concrete-vaulted AST was observed in the basement. Additionally, the building contained one 55-gallon drum of motor oil and eight empty 55-gallon drums.

Block 1152, Lot 10: At the time of the Phase I ESA site inspection, the building on Lot 10 was not accessible, but was viewed from a hole in the wall on Lot 11. The lot was occupied by a one-story vacant brick building with a collapsed floor. This building was constructed between 1926 and 1951. Historically, this parcel was occupied by a four-story residential building (c. 1907), an auto repair shop (c. 1926), a one-story packing case manufacturer (c. 1951), and unknown occupants (c. 1951 until c. 2001). During the site visit, one 275-gallon waste oil AST was observed. The building contained piles of debris consisting of auto parts, garbage, and construction debris. Building Department records indicated that a permit application was filed in 1950 to install a gasoline tank. It is unknown whether or not this gasoline tank was installed and whether it is currently present.

Block 1152, Lot 11: At the time of the Phase I ESA site inspection, Lot 11 contained a two-story brick building constructed between 1926 and 1951 and was occupied by N&P Auto Repair on the first floor with an employee break room on the second floor. Historically, this parcel was occupied by a four-story residential building (c. 1907), residences and manufacturing (c. 1926), a two-story auto repair shop (c. 1951), and unknown occupants (1951 through 2001). During the site visit, the first floor garage contained small containers of spray paint, cases of motor oil, two hydraulic lifts with external hydraulic oil canisters, a small solvent degreasing station, and a radiator fluid wash bath. The floor was observed to be stained with automobile fluids and the shop was observed to generally practice poor housekeeping. The building reportedly had a crawl space but it was inaccessible at the time of the inspection.

Block 1152, Lot 12: At the time of the Phase I ESA site inspection, Lot 12 was occupied by a two-story brick building containing an electrical contractor's office constructed between 1926 and 1951. Historically, this parcel was occupied by a four-story factory building with residences on the fourth floor (c. 1907 until c. 1926), a one-story iron works factory (c. 1951), and unknown occupants (c. 1976 until c. 2001). There was no evidence of current or historical on-site storage tanks.

Block 1152, Lot 13: At the time of the Phase I ESA site inspection, Lot 13 was occupied by a gravel parking lot used for taxi cab parking with a small elevated office in the rear of the lot. Historically, this parcel was occupied by four, four-story, store-fronted residential buildings (c. 1904), a two-story auto repair shop (c.1926), an auto repair shop and garage (c. 1951 until c. 1986), and a vacant lot (c. 2001). The 1926 historical map indicated that a 1,000-gallon gasoline UST was located on-site. This parcel was listed for three 550-gallon diesel USTs on the regulatory database installed in 1969. Their registration expired in 1993. Records maintained by the Fire Department revealed that a permit for three 550-gallon tanks filed in 1984 expired in 1989. These are likely the same tanks listed in the regulatory database. It is unknown whether or not these tanks have been removed or remain on the parcel. During the site visit, no evidence of on-site tanks, such as fill caps or vent pipes, was observed. Discharges from the east-adjacent off-site property (former Emsig Manufacturing property) may have also affected on-site conditions.

Lot 13, 235 West 60th Street, is subject to a suspended enforcement action related to improper underground storage tank registration for three 550-gallon diesel underground storage tanks. The enforcement action is suspended pending completion of the remedial investigation under the Brownfield Cleanup Program.

Block 1152, part of Lot 43: At the time of the Phase I ESA site inspection, Lot 43 was occupied by a gravel lot used for parking. Historically, this parcel was occupied by nine, five-story store-fronted residential buildings (c. 1907 until c. 1926), a vacant parcel used for parking and a gasoline station with a small one-story office (c. 1951), a vacant lot (c. 1976), and a parking lot (c. 1986 through the present). Buildings Department records indicated that an unspecified number of gasoline tank installation permits were applied for in 1947. These permits are most likely associated with the former on-site gasoline station noted on the 1951 Sanborn map. These tanks apparently remain in place.

Block 1152, Lot 52: At the time of the Phase I ESA site inspection, Lot 52 contained a one-story concrete block and brick building used by 3G Studio Corporation for sound stage and set building activities. This building was constructed sometime between 1907 and 1926. There was no evidence to indicate the current presence of petroleum or chemical storage tanks on-site. Historically, this parcel was occupied by a one- to two-story building with a storefront (c. 1907), a one-story auto repair shop (c. 1926), a metal works factory (c. 1951), and a one-story building with unknown occupants (between 1976 and 2001). Storage tanks may have been in use on-site in the past, but there were no records to indicate any such tanks.

Block 1152, Lot 53: At the time of the Phase I ESA site inspection, Lot 53 contained a one-story (with basement) brick building used by 3G Studio Corporation for sound stage and set building activities. This building was constructed between 1926 and 1951. This building was connected to the building on Lot 52 and shared a similar facade. Historically, this parcel was occupied by two, five-story residential buildings (c. 1907 until c. 1926), a one to two-story garage (c. 1951), and a one- to two-story sound stage (1976 through the present). Buildings Department records indicated that a gasoline tank installation permit was applied for in 1950. Site interviews indicated that there were no active gasoline tanks on-site. It is not known whether this tank was ever installed, and if so, whether it was removed.

Block 1152, Lot 55: At the time of the Phase I ESA site inspection, Lot 55 was occupied by a gravel lot containing parked trucks and cars. This parking area was used by the east-adjacent 3G Studio Corporation. There was no evidence to suggest the presence of chemical or petroleum storage tanks. Historically, this parcel was occupied by a five-story residential building (c. 1907 until c. 1926) and then a vacant lot used for parking (c. 1951 until the present). The former residential building may have utilized fuel oil storage tanks, however, no records indicated such usage.

2.0 SCOPE OF WORK

The objective of the remedial investigation is to acquire data on-site that would be used to guide the remediation and construction and be useful in guiding further investigations or interim remedial measures. To accomplish this objective, AKRF will perform the following scope of work:

- Perform an electromagnetic survey across portions of the site where USTs are suspected (Lots 13 and 43);

- Investigate large-scale geophysical anomalies and remove any USTs and contaminated soil encountered;
- Install nineteen soil borings across the project site, and collect soil samples for laboratory analysis from each of the soil borings;
- Install groundwater monitoring wells at nine of the soil boring locations and collect groundwater samples for laboratory analysis from each the wells; and
- If contamination is present in soil and/or groundwater, install additional soil borings and/or monitoring wells to delineate its extent.

All work will be performed in accordance with the specifications provided in the Health and Safety Plan (Appendix A). Based on the results of the investigation, reports will be prepared as outlined in Section 5.0.

2.1 Geophysical Investigation and Remediation

A geophysical survey will be performed on Lots 13 and 43. Lots 13 and 43 are currently used for outdoor storage and automobile parking, but have the potential for underground storage tanks based on historical information (Section 1.4). The geophysical survey will be performed in accordance with Section 2.1.1. If geophysical anomalies and potential USTs are detected, appropriate equipment will be mobilized to excavate in the vicinity of the anomalies, in accordance with the protocol presented in Section 2.1.2.

Lot 13 is subject to a suspended enforcement action related to improper tank registration for three 550-gallon diesel USTs. The presence of the USTs could not be confirmed during the Phase I ESA; however, no evidence of on-site tanks, such as fill caps or vent pipes was observed on Lot 13. The enforcement action is suspended pending completion of the remedial investigation under the Brownfield Cleanup Program. Any underground storage tanks identified during the geophysical investigation will be registered properly as part of the tank removal process.

2.1.1 Geophysical Survey

The geophysical survey will be completed by using a combination of electromagnetic (EM) induction metal detector and ground penetrating radar (GPR) surveys. The EM and GPR survey methods are able to identify anomalies in subsurface conductivity caused by the presence of buried metal objects, and changes in soil characteristics. The cause of these anomalies will then be inferred based on knowledge of previous land usage and observed site conditions. Target areas will be surveyed on transects at 20-foot intervals to detect any subsurface anomalies. The locations of any readings will be marked on the pavement and recorded on a site diagram.

2.1.2 Geophysical Anomaly Investigation

The approximate location of each geophysical anomaly will be marked on the asphalt surface with spray paint. The work area will be cordoned off with safety tape/construction fencing or other appropriate barricades to prevent pedestrian or vehicular traffic during excavation.

An excavator and crew will be mobilized to investigate the potential USTs and other unexplainable large-scale geophysical anomalies (explainable areas are those associated with known structures, e.g., manholes, utility lines, transformer vaults). At each anomaly or suspected tank location, the excavator will be directed by AKRF personnel to fully explore and identify the cause of the anomaly (i.e., a pit will be excavated approximately ten feet beyond the outermost anomaly markout and approximately ten feet deep).

Geophysical Anomalies

If there is reason to believe that contamination is associated with any other buried objects encountered during excavation activities, the suspect materials (sludge, liquid or solids) and any suspected affected media (soil and/or groundwater) will be sampled for appropriate waste disposal characteristics. Contaminated material will be stockpiled on plastic sheeting and, if the soil will remain on-site overnight, the stockpile will be covered with plastic sheeting in accordance with Section 3.1.2. Excavated soil, sand and/or gravel exhibiting photoionization detector (PID) readings of less than 5 parts per million (ppm) and no other evidence of contamination will be segregated in a separate stockpile for possible use as backfill. Lateral excavation will be terminated once all noticeably contaminated soil has been removed from the excavation walls. Vertical excavation will be terminated once all noticeably contaminated soil has been removed from the excavation bottom or until bedrock or the water table is encountered, whichever is more shallow. Excavated soil will be managed in accordance with the Section 3.0.

Once excavation appears complete, endpoint samples will be collected. Samples will be analyzed for STARS volatile organic compounds (VOCs) and MTBE using EPA Method 8021, and STARS semivolatile organic compounds (SVOCs) using EPA Method 8270. Table 1 summarizes the laboratory methods that will be used to analyze laboratory samples and the sample container type, preservation, and applicable holding times.

Underground Storage Tank Removal

All appropriate authorities, including NYS DEC and the New York City Fire Department, will be notified of tank removal activities, as required by law. All applicable permits will be obtained before commencing any work, including temporary closure of sidewalks and/or access roads. All work will be accomplished in accordance with federal, state, and local requirements and accepted safety standards, and will be performed in accordance with the specifications provided in the Health and Safety Plan (Appendix A).

If tank entry is necessary to carry out the recommended tasks, the procedures outlined in American Petroleum Institute (API) Publications 2015, 2015A, and 2217; Recommended Practice 1631; and applicable OSHA standards for confined space entry shall be followed.

All the tanks will be closed and removed according to the most current API Recommended Practice 1604 and any applicable federal, state and local regulatory agency requirements. The following subsections are for guidance purposes only and should be used only as a reference to requirements and recommendations.

Tank Preparation

The liquid product from any piping will be drained into each tank. Piping from each tank will be disconnected. If applicable, piping will be disconnected and capped with non-shrinking concrete plaster where it enters the building. The liquid product from each tank will be emptied using either an explosion proof or air-driven pump or vacuum truck and will be disposed of in accordance with applicable federal, state and local regulations and the Investigation Derived Waste Plan (Section 3.0).

Initially, the paved surface and soil from above and around the tanks will be excavated and stockpiled in an area designated for uncontaminated soils in accordance with Section 3.0. The area above the top of each tank will be excavated; if necessary, hand-excavation techniques will be employed around the immediate vicinity of each tank. Drop tubes, fill pipes, gauge pipes and any other tank fixtures, except the vent lines, will be removed and then all openings will be plugged. The vent lines will remain connected until the tank is purged. Each tank will be purged of all flammable vapors using a method outlined in API Recommended Practices 1604. During purging of each tank, the work area will be monitored for flammable vapors with a CGI or equivalent instrumentation. If the monitoring shows flammable, toxic, or oxygen deficient conditions, corrective action will be taken, as specified by the HASP (Appendix A).

In the absence of a manway, an access hole will be cut into each tank for the removal of residual liquids and solids after CGI readings show a nonexplosive atmosphere within the tank (i.e. less than 10% of the LEL or oxygen levels that cannot sustain a fire). Only non-sparking tools will be used for cutting the required access hole. The tanks then will be removed from the ground and placed on an 8-mil plastic liner. All associated piping will be removed from the ground and placed on the liner.

Tank Cleaning

If liquid is present in the tank (petroleum, petroleum-water mixture or other liquid), it will be pumped into New York State Department of Transportation (DOT)-approved drums or a vacuum truck and disposed of in accordance with applicable federal, state and local regulations. The tanks will be cleaned of residual liquids and sludge. All tank cleaning activities will meet the requirements of OSHA 29 CFR 1910.146 for confined space entry. Contaminated sand which may have been used to close the tanks will be segregated and stockpiled on plastic sheeting and, if the soil will remain on-site overnight, the stockpile will be covered with plastic sheeting in accordance with Section 3.1.2. Any clean sand will be stockpiled with clean, excavated soils. If the tanks have been closed with concrete or foam, they will be treated as a single item and no attempt will be made to clean the inside. Any removed liquids and/or sludge, along with spent cleaning materials and/or personal protection equipment, will be placed in DOT-approved drums for proper off-site disposal in accordance with Section 3.0.

Tank Removal

If encountered, any overlying concrete pad, and underlying concrete tank support structures or vaults will be removed. Contaminated concrete will be stockpiled in a separate pile and managed in accordance with Section 3.1.2. Uncontaminated concrete will be managed as construction/demolition debris in accordance with Section 3.0. Tanks and all associated piping will be removed from the ground and placed on 8-mil polyethylene plastic. The outside of the tanks will be cleaned and inspected for integrity. The appropriate local authorities will be contacted for any required inspections. Each removed and cleaned system will be disposed of at an appropriate off-site facility or scrap dealer.

Soil surrounding the tank will be monitored for contamination using a PID and visual and olfactory inspection. Soil exhibiting PID readings greater than 5 ppm above background and/or obvious odors or staining will be stockpiled for testing and subsequent off-site disposal (along with any contaminated sand removed during tank cleaning). Apparently contaminated material will be stockpiled on plastic sheeting and, if the soil will remain on-site overnight, the stockpile will be covered with plastic sheeting in accordance with Section 3.1.2. Excavated soil, sand and/or gravel exhibiting PID readings of less than 5 ppm and no other evidence of contamination will be segregated in a separate stockpile for possible use as backfill. Lateral excavation will be terminated once all noticeably contaminated soil has been removed from the tank pit walls. Vertical excavation will be terminated once all noticeably contaminated soil has been removed from the tank pit bottom or until bedrock or the water table is encountered, whichever is more shallow. Excavated soil will be managed in accordance with Section 3.0.

Once excavation appears complete, endpoint samples will be collected. Samples will be analyzed for STARS VOCs and MTBE using EPA Method 8021, and STARS SVOCs using EPA Method 8270.

2.2 Subsurface Investigation

The proposed initial investigation consists of the advancement and sampling of 18 soil borings, nine of which will be converted to monitoring wells. The subsurface investigation will be performed to determine the presence and nature of potential contamination in the soil and groundwater on the project site.

Nine soil borings/groundwater monitoring wells and nine soil borings will be installed across the project site. The proposed locations of the soil borings and groundwater monitoring wells are shown on Figure 2. Soil boring and monitoring well locations were selected based on suspected or known tanks, and to assess general soil and groundwater conditions across the project site. Monitoring well elevations will be surveyed to determine groundwater flow direction. The perimeter well locations will assist in determining the potential for off-site contaminants to migrate on-site, and for possible on-site contaminants to migrate off-site.

Locations may be offset due to unexpected conditions in the field such as utilities and surface or subgrade obstructions. Prior to the commencement of drilling, utility mark outs will be requested from the New York City/Long Island One Call Center.

2.2.1 Preliminary Soil Boring Installation

The eighteen (18) soil borings will be advanced using a 4¼-inch internal diameter hollow stem auger rotary drill. The nine (9) soil borings not intended for completion as groundwater monitoring wells will be advanced to approximately two feet beyond the groundwater table or to the bedrock surface, whichever is shallower. The nine (9) soil borings intended for completion as groundwater monitoring wells will be advanced to approximately five to eight feet beyond the groundwater table, if possible. Groundwater is anticipated at a depth of approximately 13 to 17 feet below the ground surface.

A stainless steel, 24-inch split-spoon sampler will be driven through the subsurface ahead of a hollow-stem auger to approximately two feet beyond the groundwater table. Soil sampling will begin below the former building slabs, if present. Soil samples will be collected on a continuous basis using split-spoon samplers until two feet beyond the groundwater table surface, and every 5 feet thereafter. Each sample will be logged and screened for organic vapors using a PID by AKRF field personnel.

Two soil samples from each of the borings will be selected for laboratory analysis based on PID response and visual and olfactory indications of contamination. The depth intervals of samples collected will be determined based on trends observed in the field. In the absence of observable contamination, the two soil samples will be collected from near the surface (a 2-foot interval within the top 5 feet sampled in the boring) and from the soil-groundwater interface.

Drill cuttings and decontamination water will be containerized and handled as described in Section 3.1.1. Boreholes will be grouted with a bentonite-cement slurry upon completion. Soil sampling equipment (split spoons) will decontaminated between samples, and augers will be decontaminated between soil boring locations as described in Section 4.2.2.

2.2.2 Soil Sample Collection

Soil samples will be submitted for laboratory analysis of target compound list (TCL) volatile organic compounds (VOCs), TCL semi-volatile organic compounds (SVOCs), target analyte list (TAL) metals, polychlorinated biphenyls (PCBs) and pesticides. Table 1 summarizes the laboratory methods that will be used to analyze laboratory samples and the sample container type, preservation, and applicable holding times.

Soil sampling will be conducted according to the following procedures and the sample handling procedures outlined in Section 4.2.4:

- Characterize the sample according to the modified Burmister soil classification system. The modified Burmister system complies with the New York State Department of Transportation soil description procedure (NYSDOT Soil Mechanics Bureau STP-2 dated December 1994).
- If advancing soil borings, collect an aliquot of soil from each sampling location and place in labeled sealable plastic bags. Place the plastic bags in a chilled cooler to await selection of samples for laboratory analysis.
- After selecting which samples will be analyzed in the laboratory, fill the required laboratory-supplied sample jars with the soil from the selected sampling location or labeled sealable plastic bags. Seal and label the sample jars as described in Section 4.2.4 and place in an ice-filled cooler.
- Decontaminate any soil sampling equipment between sample locations as described in Section 4.2.2.
- Record boring number, sample depth and sample observations (evidence of contamination, PID readings, soil classification) in field log book and boring log data sheet.

2.2.3 Groundwater Monitoring Well Installation

Monitoring wells will be installed at eight of the sixteen soil boring locations. The monitoring wells will be installed within the soil borings, and will consist of two-inch internal diameter Schedule 40 PVC casing. Once reaching the desired depth, monitoring wells will be installed in the borings according to the following procedure:

- Measure the depth to water in the open hole using an electric water level indicator.
- Place PVC riser with a ten-foot length of PVC 0.10-slotted screen at the bottom of the borehole. The well screen will be situated to provide sufficient water in the well for sampling at all times and to limit sample collection close to the base of the well. It is anticipated that at least five feet of screen will be placed below the water table for each well.

- Install No. 1 sand filter pack around the well screen to a depth of one to two feet above the top of the screen.
- Install a bentonite seal to a depth of one to two feet above the filter pack.
- Backfill the remainder of the annular space using a bentonite-cement grout.
- Complete the well with a locking cap flush-with-grade curb box set in concrete. Provide a concrete apron around the curb box to direct run-off away from the well.
- Document well installation data (location, depth, construction details, water level measurements) in the field logbook or on field data sheets.

2.2.4 Groundwater Monitoring Well Development

Following well installation, the wells will be developed according to the following procedure:

- Measure the depth to water using an electric water level indicator (or oil/water interface probe, if appropriate) and the total depth of the well using a weighted tape. Use these measurements to calculate the length of the water column. Calculate the volume of water in the well using 0.163 gallon per foot of water column as the conversion factor for a 2-inch diameter well.
- Develop the well using a submersible pump and discharge the water to 55-gallon drums designated for well development water. Discharged water may also be collected in 5-gallon buckets and subsequently transferred to a 55-gallon drum. Surging will be employed during development to remove fines from the sand pack, the adjacent formation and from the well.
- During development, collect periodic samples and analyze for turbidity and water quality indicators (pH, temperature, dissolved oxygen, reduction-oxidation potential, and specific conductivity) with measurements collected approximately every five minutes.
- Continue developing the well until turbidity is less than 50 nephelometric turbidity units (NTUs) for three successive readings and until water quality indicators have stabilized to within 10% for pH, temperature and specific conductivity for three successive readings, or until three well volumes have been purged from the well.
- Document the volume of water removed and any other observations made during well development in the field logbook or on field data sheets.
- Decontaminate the equipment prior to and following development at each well location as described in Section 4.2.2.

All well development, decontamination, and purge water will be containerized in 55-gallon drums and handled as described in Section 3.0.

2.2.5 Monitoring Well Sampling

Groundwater samples will be collected at least one week following well development. Groundwater samples will be submitted for laboratory analysis of target compound list (TCL) volatile organic compounds (VOCs), TCL semi-volatile organic compounds (SVOCs), dissolved and total target analyte list (TAL) metals, polychlorinated biphenyls

(PCBs) and pesticides. Table 1 summarizes the laboratory methods that will be used to analyze laboratory samples and the sample container type, preservation, and applicable holding times.

Low flow sampling techniques will be used based on the guidance in the USEPA Region II's Ground Water Sampling Procedure for Low Stress (Low Flow) Purging and Sampling dated March 16, 1998. Sampling will be conducted according to the following procedure and the sample handling procedures outlined in Section 4.2.4:

- Remove the locking cap and measure the vapor concentrations in the well with a PID.
- Measure the depth to water and total well depth. If evidence of contamination (e.g., oil-like product, staining, sheens, odors) is detected during drilling, check for the presence of light non-aqueous phase liquid (LNAPL) or dense non-aqueous phase liquid (DNAPL) using an oil/water interface probe. Measure the thickness of NAPL, if any, and record in field book and well log. Collect a sample of NAPL using a disposable plastic weighted bailer or similar collection device. Groundwater samples will not be collected from wells containing measurable NAPL.
- Use the water level and total well depth measurements to calculate the length of the mid-point of the water column within the screened interval. For example, for a shallow well where the total depth is 15 feet, screened interval is 5 to 15 feet, and depth to water is 7 feet, the mid-point of the water column within the screened interval would be 11 feet. Similarly for a deep well where the total depth is 40 feet, screened interval is 30 to 40 feet, and depth to water is 15 feet, the mid-point of the water column within the screened interval would be 35 feet.
- Connect dedicated tubing to either a submersible or bladder pump and lower the pump such that the intake of the pump is set at the mid-point of the water column within the screened interval of the well. Connect the discharge end of the tubing to the flow-through cell of a Hydrolab Quanta (or equivalent) multi-parameter meter. Connect tubing to the output of the cell and place the discharge end of the tubing to a 55-gallon drum designated for well-purge water. Discharged water may also be collected in 5-gallon buckets and subsequently transferred to a 55-gallon drum.
- Activate the pump at the lowest flow rate setting of the pump.
- Measure the depth to water within the well. The pump flow rate may be increased such that the water level measurements do not change by more than 0.3 feet as compared to the initial static reading. The well-purging rate should be adjusted so as to produce a smooth, constant (laminar) flow rate and so as not to produce excessive turbulence in the well. The expected targeted purge rate will be around 500 milliliters per minute and will be no greater than 4 liters per minute.
- During purging, collect periodic samples and analyze for water quality indicators (e.g., pH, specific conductivity, temperature, oxidation-reduction potential (ORP), turbidity and dissolved oxygen) with measurements collected approximately every five minutes.

- Continue purging the well until turbidity is less than 50 NTU and water quality indicators have stabilized to the extent practicable. The criteria for stabilization will be three successive readings for the parameters and criteria outlined in Table 2.
- If the water quality parameters do not stabilize and/or turbidity is greater than 50 NTU within two hours, purging may be discontinued. Efforts to stabilize the water quality for the well must be recorded in the field book, and samples may then be collected as described herein.
- After purging, disconnect the tubing to the inlet of the flow-through cell. Collect groundwater samples directly from the discharge end of the tubing, place into the required sample containers. Samples should be collected first for VOCs, then SVOCs, PCBs, and the remaining inorganic analyses. Label the containers and place in a chilled cooler as described in Section 4.2.2.
- Collect one final field sample and analyze for water quality parameters (pH, specific conductivity, temperature, ORP, turbidity and dissolved oxygen).
- Once sampling is complete, remove the pump and tubing from the well. Disconnect the tubing and discard, or place it back in the well for reuse during the next sampling event.
- Decontaminate the equipment used, including the pump, water level indicator, oil/water interface probe, and flow-through cell as described in Section 4.2.2.
- Record all measurements (depth to water, depth to NAPL, water quality parameters, turbidity), calculations (well volume) and observations in the project logbook and/or field data sheet.

2.2.6 Delineation Soil Boring Installation (As Needed)

If contaminated soil is detected in soil borings, additional investigation will be performed to delineate the extent of the contamination on-site. Where similar contamination is detected in the same stratum in two neighboring sampling locations, and it is deemed likely that the contamination is continuous, then it will be assumed that the contamination is continuous between those two points and no additional testing will be performed in that area. Similarly, if contamination is detected at a sampling location near the site boundary, then it may be assumed that the contamination extends to the boundary of the site.

Soil contamination will be delineated using the drilling and sampling procedures described in Sections 2.2.1 and 2.2.2. If the soil contamination is readily detected visually and by field screening, the initial delineation may be performed by screening soil in the field, and laboratory analysis results will be used for confirmation. Starting from each soil sampling location where soil contamination was detected, an initial delineation sampling point will be located at a distance of approximately 25 feet in each direction (north, south, east, or west) in which the extent of the contamination is undetermined. If contamination is detected by field screening in any of the initial soil sampling locations, sampling will be performed at additional sampling locations at approximately 25-foot intervals until a location is reached where no contamination is detected by field screening, or to the property boundary. If the contamination appears to extend off-site, a separate plan will be submitted for off-site delineation.

2.2.7 Soil Gas Survey (As Needed)

If total VOC levels exceed the TAGM guidance standards in areas where soil is not anticipated to be removed as part of remediation or general construction, a confirmatory soil gas survey will be conducted.

A minimum of four evenly spaced locations approximately five feet from the outermost limit of the planned or completed excavation (north, south, east and west, unless precluded by structures or other obstructions), soil gas samples will be collected using a hand-held drill or equivalent with a sampling probe (a ⅝-inch diameter stainless steel shaft with a hardened point and slotted intakes) connected to polyethylene sampling tubing. The sampling tubing will extend from the tip of the drive point to above grade. Collectively, the disposable tip, sampling port and sampling tube are referred to as the "soil gas sampler". Soil gas samples will be collected using the following procedure:

- Prepare the sampling site by drilling through the asphalt or concrete surface using a concrete drill;
- Attach new, clean ⅛-inch, inside-diameter polyethylene tubing to the disposable tip;
- Drive the soil gas sampler and attached tubing to a depth of 18 inches below the bottom of the asphalt or concrete surface;
- Retract the soil gas sampler approximately one foot to create a void between the interval of 6 and 18 inches below the surface;
- Record total depths (interval below grade) to which probe is advanced and then withdrawn for sample collection;
- Seal the annulus at the surface (between the surface and probe) by placement and hydration of bentonite chips;
- Install a new section of flexible hose to the peristaltic pump and connect the sample tubing to the flexible hose. Activate the pump and remove approximately 500 milliliters (mL) of air from the sampling assembly. The air withdrawal flow rate shall be minimized to the extent practicable between 0.1 and 0.5 liters per minute to prevent infiltration of fugitive air from the ground surface via the annulus of the sampling probe;
- Open the sample port on a PID and record stabilized reading in a field notebook;
- If the PID reading is more than 5 ppm above background, open the sample port on a labeled Tedlar bag and attach it to the discharge end of the flexible hose. Fill the bag approximately ⅔ full and close the sample port. Detach the bag and repeat the process to fill a total of two Tedlar bags;
- Place the two Tedlar bags (to be analyzed in the laboratory for VOCs using EPA Method TO-15) in a cooler to prevent exposure to sunlight. The cooler shall not contain ice; and
- Document sample locations and measurements (sample flow rate, PID readings, temperature) in the field logbook or on field data sheets.
- An attempt will be made to survey the location of soil gas survey points.

If levels of VOCs in soil gas are detected above outdoor air background and established regulatory guidelines or criteria (e.g., Evaluating the Vapor Intrusion into Indoor Air, EPA 530-F-02-052, November 2002), the need for further investigation or remedial measures will be discussed in the Remedial Investigation Report and/or the Remedial Action Plan.

3.0 INVESTIGATION-DERIVED WASTE PLAN

This section outlines the plan for the management of investigation-derived wastes (IDW), including the approach for handling and disposal of various potential waste streams generated during the subsurface investigation. IDW will be treated as potentially contaminated; decisions will not be made regarding the fate of on-site soil or water by using field screening techniques.

3.1 Soil Management

To mitigate emissions of odors and vapors, to the extent possible, the exposure of contaminated soil to the atmosphere will be minimized.

3.1.1 Drilling Cuttings

Soil cuttings will be transferred to 55-gallon drums, secured and stored on-site in accordance with Section 3.3. Upon receipt of soil laboratory analytical results, the soil drums will be disposed of in accordance with Section 3.4.

3.1.2 Soil Stockpiling

Soil generated during excavation will be stockpiled on approximately 8-mil polyethylene sheeting. If the soil is expected to remain on-site overnight or longer, the stockpile will be covered with similar polyethylene sheeting and secured with large rocks or other appropriate weights. Soil stockpiles will also be covered if odors or vapors are notable. Contaminated soil will be promptly removed from the site. IDW appropriate for re-use may remain on-site until the start of general excavation activities, provided this is in accordance with federal, state and local regulations and it is properly secured.

Soils will be stockpiled based on their known or anticipated type and/or level of contamination (based on previous data, PID readings, odor, staining, etc.) and whether they are intended for reuse on-site as grading/backfill material or intended for off-site disposal. Stockpiles will be separated by a sufficient distance to ensure that mixing of dissimilar or potentially dissimilar materials does not occur. The location and classification of stockpiles (clean, contaminated or pending analysis) will be tracked on site drawings and updated as necessary. Stockpiles intended for off-site disposal may be mixed with other compatible stockpiles on-site (compatibility will be determined by the requirements of the receiving disposal facility), but hazardous wastes will not be mixed with non-hazardous wastes. Stockpiles will not be placed outside of the site boundaries without prior approval of NYS DEC.

3.2 Water Management

Water generated during site investigation activities, such as from decontamination activities, well development and well purging, will be transferred to 55-gallon drums, and stored on-site in accordance with Section 3.3. Upon receipt of groundwater laboratory analytical results, the water will be disposed of in accordance with Section 3.4. Based on the results of characterization, liquid IDW may be disposed of off-site or disposed of in NYCDEP sewers, provided it is done in conformance with NYCDEP requirements.

3.3 Drum Storage

Drums will be stored in accordance with the following:

- Drums will be closed when not in use. Drums expected to remain on-site overnight or longer will be stored with the lids secured.
- A label will be placed on each drum with the name of the generator, contact name and phone number, results of characterization (or pending analysis), date generated, boring number and medium (water, NAPL, soil, etc.).
- If the results of characterization indicate that a drum contains hazardous waste, requirements relating to maximum accumulation time (generally 90 days) will apply. Hazardous drums will be placed in areas of secondary containment constructed using plastic and berms or equivalent.
- Spills or releases will be managed as specified in the Emergency Response Procedures of the Health and Safety Plan attached as Appendix A.

3.4 Transportation

To minimize dust, odor and vapors, excavated soil will be hauled in covered trucks. Transportation of material leaving the site for off-site disposal will be in accordance with federal, state and local requirements covering licensing of haulers and trucks, placarding, truck routes, manifesting, etc. If applicable, manifests and truck tickets will be submitted to NYS DEC.

3.5 Soil Disposal

Soil will be disposed of off-site in accordance with applicable federal, state and local requirements, including those for hazardous waste, industrial waste, petroleum contaminated soil, construction and demolition debris, etc. Soil will be tested in accordance with the requirements of the receiving facility. Copies of correspondence with disposal facilities concerning classification of materials, testing and permits/approvals will be submitted to NYS DEC.

Any imported off-site backfill material will be clean and free of debris, cinders, combustibles, wood, roots, and any staining or odors. Any off-site material used as backfill will be either from a NYSDOT-approved source, or will qualify as "exempt fill" under NYCRR Part 360.

3.6 Water Disposal

Based on the groundwater analytical results, water from investigation activities will be either transported to an off-site facility or disposed of on-site in NYCDEP sewers.

Off-site disposal will be in accordance with NYS DEC and USEPA regulations. If on-site disposal is feasible, water will be handled in conformance with federal, state and local regulations and/or NYCDEP requirements for discharge to local sewer lines.

4.0 QUALITY ASSURANCE/QUALITY CONTROL PLAN

The Quality Assurance Project Plan (QAPP) presents the project team (Section 4.1), and field and laboratory procedures (Section 4.2).

4.1 Project Team

The project team will be drawn from AKRF professional and technical personnel and AKRF's subcontractors. All field personnel and subcontractors will have completed a 40-hour training course and up-to-date 8-hour refresher course that meet the Occupational Safety and Health Administration (OSHA) requirements of 29 CFR Part 1910. The following sections describe the key project personnel and their responsibilities.

4.1.1 Project Director

The project director will be responsible for the general oversight of all aspects of the project, including scheduling, budgeting, data management and decision-making regarding the field program. The project director will communicate regularly with all members of the AKRF project team, the NYS DEC, and the Volunteer to ensure a smooth flow of information between involved parties. Michelle Lapin will serve as the project director for the remedial investigation. Ms. Lapin's resume is included in Appendix B.

4.1.2 Project Manager

The project manager will be responsible for directing and coordinating all elements of the investigation. She will prepare reports and participate in meetings with the Volunteer and/or the NYS DEC. Kate Brunner will serve as the project manager of the remedial investigation. Ms. Brunner's resume is included in Appendix B.

4.1.3 Field Team Leader

The field team leader will be responsible for supervising the daily sampling and health and safety activities in the field and will ensure adherence to the Remedial Investigation Work Plan and HASP. He/she will report to the project manager on a regular basis regarding daily progress and any deviations from the work plan.

The field team leader will be qualified to perform soil screening activities (e.g., be able to detect petroleum of chemical odors and chemical staining and be proficient in the use of monitoring equipment such as a photoionization detector and particulate monitor) and to make the distinction between potentially contaminated and non-contaminated soil based on observations made during soil screening activities.

The field team leader responsibilities will be assigned to appropriate AKRF personnel after approval of the Remedial Investigation Work Plan. His or her resume will be provided to NYS DEC at this time.

4.1.4 Project Quality Assurance/Quality Control Officer

The Quality Assurance/Quality Control (QA/QC) Officer will be responsible for adherence to the QAPP. He will review the procedures with all personnel prior to commencing any fieldwork and will conduct periodic site visits or meetings to assess implementation of the procedures. If necessary, the QA/QC officer will also be responsible for having a Data Usability Summary Report (DUSR) prepared for soil, soil gas and groundwater analytical results. Andrew Rudko, Ph.D., will serve as the QA/QC officer for the remedial investigation. Dr. Rudko's resume is included in Appendix B.

4.2 Field and Laboratory Procedures

This section presents protocols for calibration of field instrumentation (Section 4.2.1), decontamination of sampling equipment (Section 4.2.2), quality control sampling (Section 4.2.3), and sample collection and handling (Section 4.2.4). This section also discusses laboratory methods that will be used for the analyses (Section 4.2.5).

4.2.1 Field Instrumentation

Field personnel will be trained in the proper operation of all field instruments at the start of the field program. Instruction manuals for the equipment will be on file at the site for referencing proper operation, maintenance and calibration procedures. The equipment will be calibrated according to manufacturer specifications at the start of each day of fieldwork, if applicable. If an instrument fails calibration, the project manager or QA/QC officer will be contacted immediately to obtain a replacement instrument. A calibration log will be maintained to record the date of each calibration, any failure to calibrate and corrective actions taken. The PID will be calibrated each day using 100 ppm isobutylene standard gas.

4.2.2 Field Decontamination Procedures

To avoid contamination and cross-contamination of samples, all sampling equipment will be cleaned before collection of each sample. The following field procedures will be followed for all samples:

Step 1: Scrub equipment with a bristle brush using a non-phosphate detergent and distilled water.

Step 2: Double rinse with distilled water.

Step 3: Air dry the equipment.

The drilling augers will be decontaminated following each boring location using a steam cleaner or pressure washer. Decontamination will be conducted on plastic sheeting (or equivalent) that is bermed to prevent discharge to the ground. Decontamination water will be transferred to 55-gallon drums and stored and disposed of as described in Section 3.0.

4.2.3 Field Quality Control Sampling

A trip blank and field blank will be included in each batch of soil samples, or 1 for each 20 samples, whichever is greater in frequency. Trip blanks will be analyzed for volatile organic compounds to check for contamination during transport and sampling procedures. Field blanks will be analyzed for volatile organic compounds, semivolatile organic compounds, PCBs, and metals to check for contamination arising from sample collection.

4.2.4 Sample Handling

This section provides protocols for sample identification, sample labeling and shipping, and sample custody.

Sample Labeling and Shipping

All sample containers will be provided with labels containing the following information:

- Project identification
- Sample identification
- Date and time of collection
- Analysis(es) to be performed

- Sampler's initials

Once the samples are collected and labeled, they will be placed in chilled coolers and stored in a cool area away from direct sunlight to await shipment to the laboratory. At the start and end of each workday, field personnel will add ice to the coolers as needed. Soil gas samples will be placed in coolers that do not contain ice. Soil and groundwater samples will be shipped to the laboratory once to twice per week. Soil gas samples will be shipped to the laboratory at the end of each workday.

The samples will be prepared for shipment by placing each sample in a sealable plastic bag, then wrapping each container in bubble wrap to prevent breakage, adding freezer packs and/or fresh ice in sealable plastic bags and the chain-of-custody form. Samples will be shipped overnight (e.g., via Federal Express) or transported by a laboratory courier. All coolers shipped to the laboratory will be sealed with mailing tape and a COC seal to ensure that the coolers remain sealed during delivery.

Sample Custody

To ensure the integrity of samples taken, a strict chain of custody record must be maintained on each sample. This begins after sampling with the entry in the sampler's field log book of the sampling details:

a) Date and time of sampling;
b) Sample location (as specific as possible);
c) The unique sample number, size, and container(s) used;
d) Sample description;
e) Weather conditions (if applicable); and
f) Any additional comments.

In addition, a record must be kept of the sample's progress from the sample site to the laboratory where it will be analyzed. This is the chain-of-custody form. The form must include:

a) The sample number;
b) The sampler's name;
c) Date and time of sampling;
d) Location at which the sample was taken, including the address, if possible;
e) A description of the sample, as best known;
f) Signatures of people involved in the chain of possession; and
g) Inclusive dates of possession of each person in the chain.

The chain-of-custody form must accompany the sample throughout its trip to the laboratory. If the sample(s) must be shipped to a laboratory, most shipping agents will refuse to sign or separately carry the chain-of-custody form. In this one case, it is permissible to put the chain-of-custody form into the box with the sample and then seal the box. The recipient of the box, the laboratory's sample custodian, can then attest to the box's arrival still sealed and unopened.

Accompanying the chain-of-custody record, or included in it, must be a request to the laboratory for sample analyses. Information required includes:

a) Name of person receiving the sample;

b) Laboratory sample number;

c) Date of sample receipt;

d) Sample allocation; and

e) Analyses to be performed.

Finally, on arrival at the laboratory, the sample custodian must enter the sample in the laboratory's sample log book. The chain-of-custody should be kept on file at the laboratory.

4.2.5 Laboratory Methods

Table 1 summarizes the laboratory methods that will be used to analyze field samples and the sample container type, preservation, and applicable holding times. A New York State ELAP certified laboratory will perform all analytical work. The laboratory will operate a Quality Assurance/Quality Control (QA/QC) program that will consist of proper laboratory practices (including the required chain-of-custody), an internal quality control program, and external quality control audits by New York State. Since investigative samples may be used as final endpoint or delineation samples, Category B deliverables will be requested.

5.0 REPORTING

5.1 Remedial Investigation Report

Upon completion of all field work and receipt of laboratory analytical results, a Remedial Investigation Report (RIR) will be prepared that will: document field activities; present field and laboratory data; evaluate exposure and risks to human health; and discuss conclusions and recommendations drawn from the results of the investigation.

As required under the BCP, the Volunteer will make the RIR available in the designated document repositories. In addition, a fact sheet summarizing the remedial investigation will be mailed to the site contact list. A public comment period of 30 days will commence with such notice; if no further action is proposed, the public comment period will be 45 days.

5.1.1 Description of Field Activities

This chapter of the RIR report will describe the field methods used to characterize the site conditions, including: sampling techniques; field screening equipment; drilling and excavation equipment; monitoring well installation procedures; and management of investigation-derived waste.

5.1.2 Soil Quality

The RIR report will include a chapter on soil quality that presents field and laboratory data and a description of soil characteristics. Field and laboratory analytical results will be presented and compared with regulatory standards and/or guidance values. Figures will be provided that illustrate soil boring locations along with corresponding contaminant concentrations. Soil boring logs and laboratory analytical reports will be provided as attachments.

5.1.3 Groundwater Quality

This chapter will present groundwater monitoring results. Well survey data and water level measurements will be used to create a groundwater contour map and determine groundwater flow direction. Groundwater analytical results will be presented in the body of the report and on figures, and the detected concentrations will be compared to regulatory standards and/or guidance values. Groundwater sampling logs and laboratory analytical reports will be provided as attachments.

5.1.4 Qualitative Human Health Exposure Assessment

The RIR will include a qualitative exposure assessment to characterize the exposure setting, identify exposure pathways, and evaluate contaminant fate and transport to determine if human receptors would be potentially affected by on-site contamination. The exposure assessment will be based upon the receptor survey and data collected as part of the site investigation including the following:

- Comparison of contaminant concentrations in environmental media with typical background levels;
- Concentrations of contaminants in environmental media; and
- Field and laboratory data, including extent of NAPL in soil and groundwater.

5.2 Remedial Action Plan

Based upon the findings of the remedial investigation, a Remedial Action Plan (RAP) will be developed for the site. The Remedial Action Plan will include recommendations specific to the planned development. The plan will set forth any additional evaluation necessary to close data gaps and/or any remedial measures necessary to address potential complete exposure pathways identified as part of the qualitative human health exposure assessment. The plan will provide an evaluation that will demonstrate that the selected remedy can achieve the cleanup goals for the site. The selected remedy will be compared to factors given in 6 NYCRR 375-1.10(c), which include: protection of human health and the environment; standards, criteria, and guidance; short-term effectiveness and impacts; long-term effectiveness and permanence; reduction of toxicity, mobility, or volume; and implementability.

As required under the BCP, the Volunteer will make the RAP available in the designated document repositories. In addition, a fact sheet summarizing the remedial investigation will be mailed to the site contact list. A public comment period of 45 days will commence with such notice.

6.0 SCHEDULE

A tentative schedule for implementing the Remedial Investigation Work Plan is provided below. Note that until the earlier phases of the investigation have been completed, no schedule for the delineation work can be prepared:

Week after start-up	Activity
1	Geophysical survey.
2	Soil boring and monitoring well installation.
3	Geophysical anomaly investigation and underground storage tank removal. Receive soil boring analytical results. Prepare soil delineation plan, if required.
4	Groundwater sampling and well surveying.
5	Soil delineation borings and/or soil gas survey, if required.
6-7	Prepare RIR and RAP.

7.0 CITIZEN PARTICIPATION

A Citizen Participation Plan dated April 2005 was prepared and submitted to the document repositories listed in Section 1.0, as a required part of the NYS DEC Brownfield Cleanup Program. The Citizen Participation Plan includes:

- A site description and history, information on the types of contamination expected at the site, and findings of previous environmental studies completed at the site, including any major issues of public concern;
- A list of contacts representing the affected and interested parties;
- Designation of local repositories for information and reports generated during this project; and
- A description of citizen participation activities that have already occurred and a schedule of planned citizen participation activities.

Citizen participation activities in accordance with Brownfield Cleanup Program requirements will be conducted for the remedial investigation by the NYS DEC in cooperation with the NYSDOH. These activities will include preparing a fact sheet that will describe the site, provide a summary of the purpose and goals of the investigation, include a project schedule, and list sources for additional information. The fact sheet will be sent to the contact list provided in the Citizen Participation Plan, which includes adjacent property owners, elected officials, and local media.

TABLES

TABLE 1
LABORATORY ANALYTICAL METHODS AND REQUIREMENTS
West 61st Street Site; New York, NY

MATRIX	PARAMETER	EPA METHOD	SAMPLE CONTAINERS	PRESERVATION	HOLDING TIMES
SOIL SAMPLES	TCL VOCs	8260	2 oz. clear glass Septum	4°C	14 days
	TCL SVOCs	8270	8 oz. clear glass	4°C	14 days
	TAL Metals	1311 / 6010B / 7470A		4°C	6 months (28 days for Hg)
	PCBs	8081		4°C	14 days
	Pesticides	8082		4°C	14 days
GROUNDWATER SAMPLES	TCL VOCs	8260	(2) 40 ml clear glass vial	HCl, 4°C	14 days
	TCL SVOCs	8270	(2) 1L amber glass	4°C	7 days
	PCBs	8081	(2) 1L amber glass	4°C	7 days
	Pesticides	8082			
	TAL Metals (total)	6000/7000 series	500 mL plastic	HNO_3, 4°C	6 months (28 days for Hg)
	TAL Metals (dissolved)*	6000/7000 series	500 mL plastic	4°C	ASAP
TANK EXCAVATION ENDPOINT SAMPLES	STARS VOCs + MTBE	8021	2 oz. clear glass Septum	4°C	14 days
	STARS SVOCs	8270	4 oz. clear glass	4°C	14 days

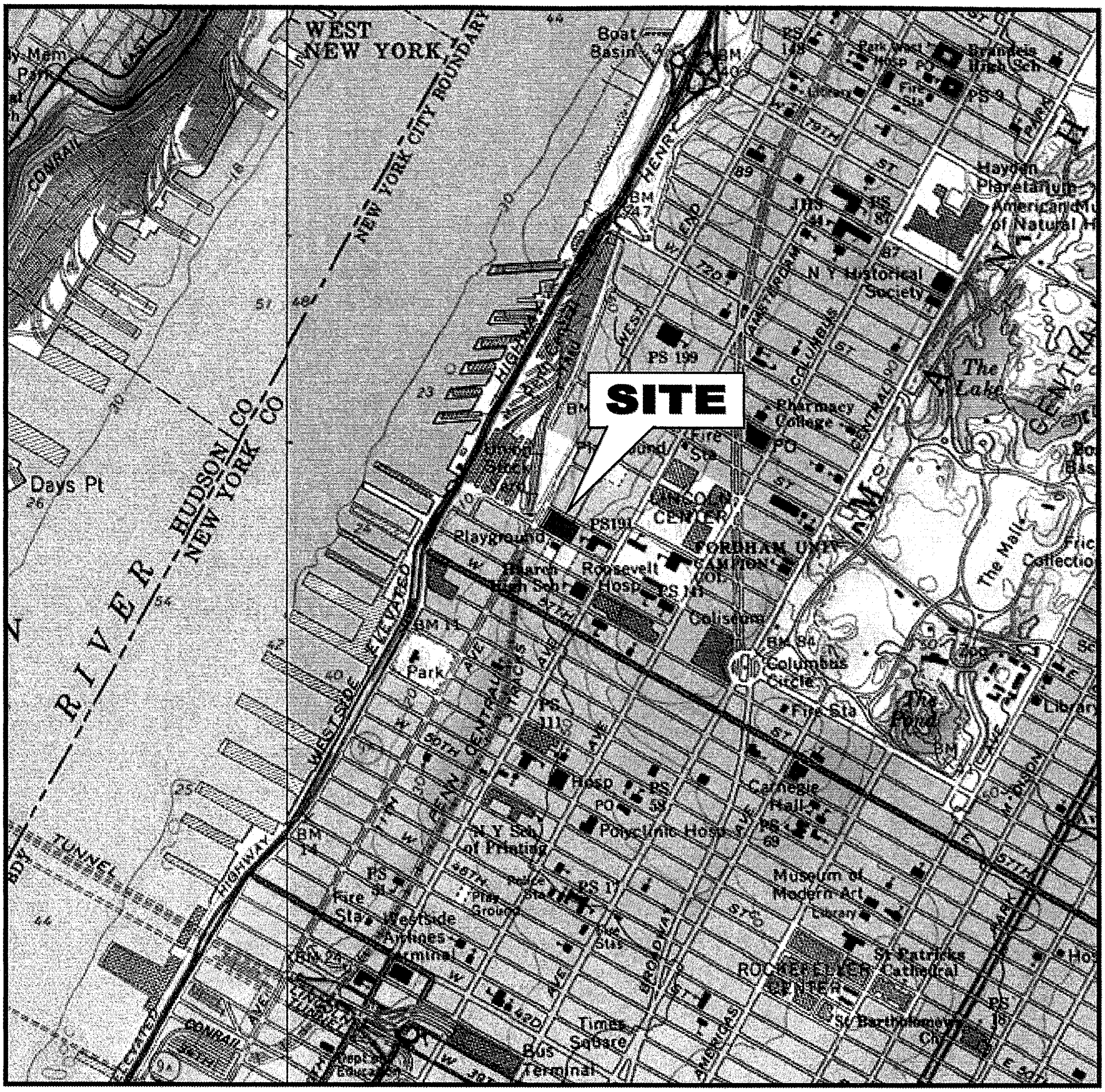
NOTES:
* Filtering of samples for dissolved metals analysis will be performed in the laboratory.
ASAP - As soon as possible

TABLE 2
GROUNDWATER SAMPLING STABILIZATION CRITERIA
West 61st Street Site; New York, NY

PARAMETER	STABILIZATION CRITERIA
pH	+/- 0.1 pH units
Specific Conductivity	+/- 3% mS/cm
ORP	+/- 10mV
Turbidity	<50 NTU
Dissolved Oxygen	+/- 0.3 mg/l

NOTES:
mS/cm = millisiemens per centimeter
ORP = oxidation-reduction potential
mV = millivolts
NTU = nephelometric turbidity units
mg/l = milligrams per liter

FIGURES



SCALE IN FEET

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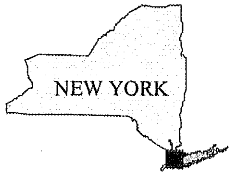
SCALE: 1"=2000'



QUADRANGLE

N

SOURCE:
USGS TOPOGRAPHIC MAP - CENTRAL PARK, N.Y.
QUADRANGLE - DATED 1966, PHOTOREVISED 1979

ALGIN PROPERTIES
West 61st Street Project
New York, New York

PROJECT SITE LOCATION

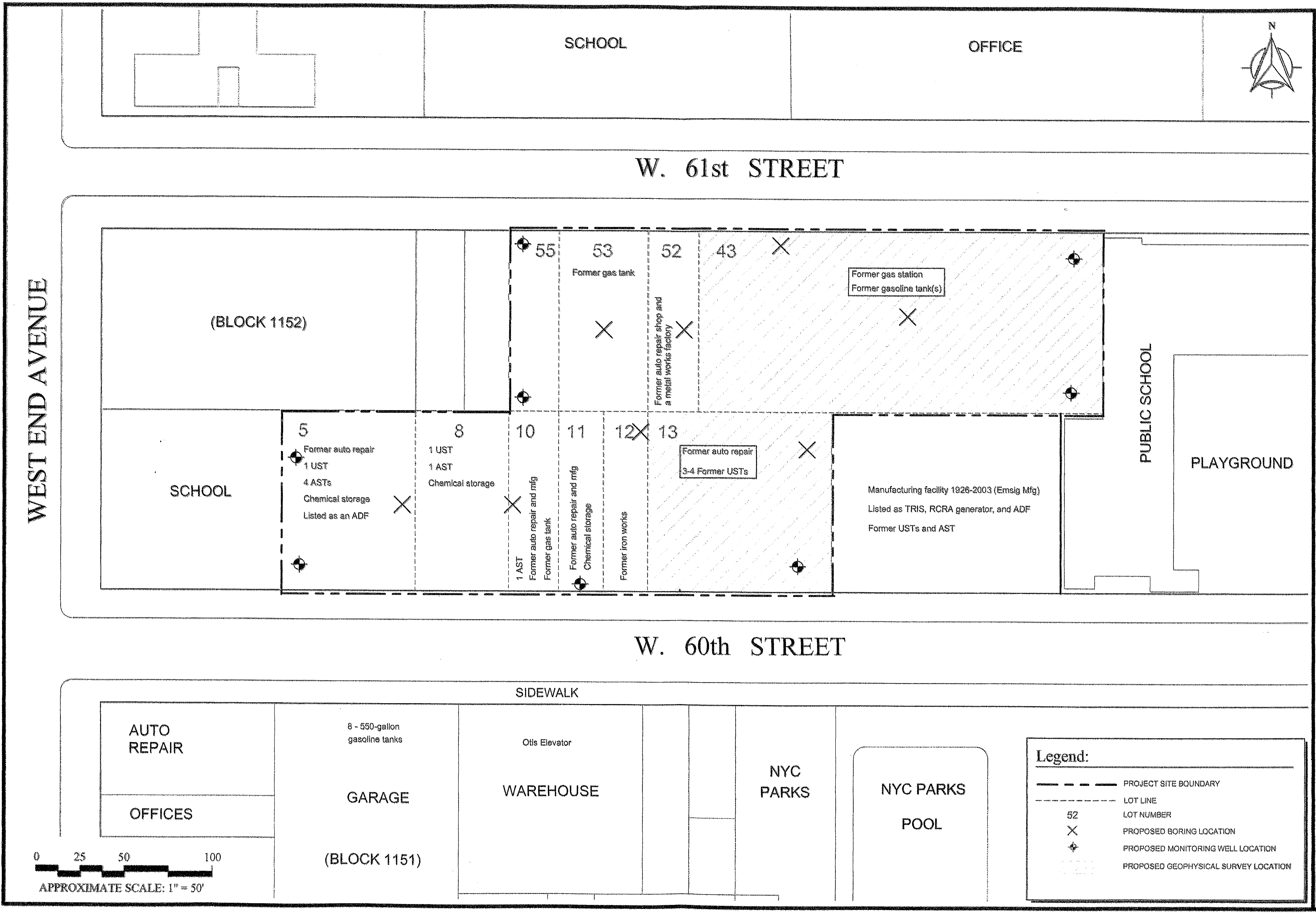
AKRF, Inc.

Environmental Consultants
440 Park Avenue South, New York, N.Y. 10016

DATE
04.05.04

PROJECT NO.
10321

FIGURE NO.
1



© 2005 AKRF, Inc. Environmental Consultants M:\AKRF Project Files\10321\BCP RI Work Plan\F2_Project Site Detail.dwg

AKRF
Environmental Consultants
440 Park Avenue South, New York, NY 10016

West 61st Street Site
New York, New York

PROJECT SITE DETAIL

DATE
04.01.05

APPROX SCALE
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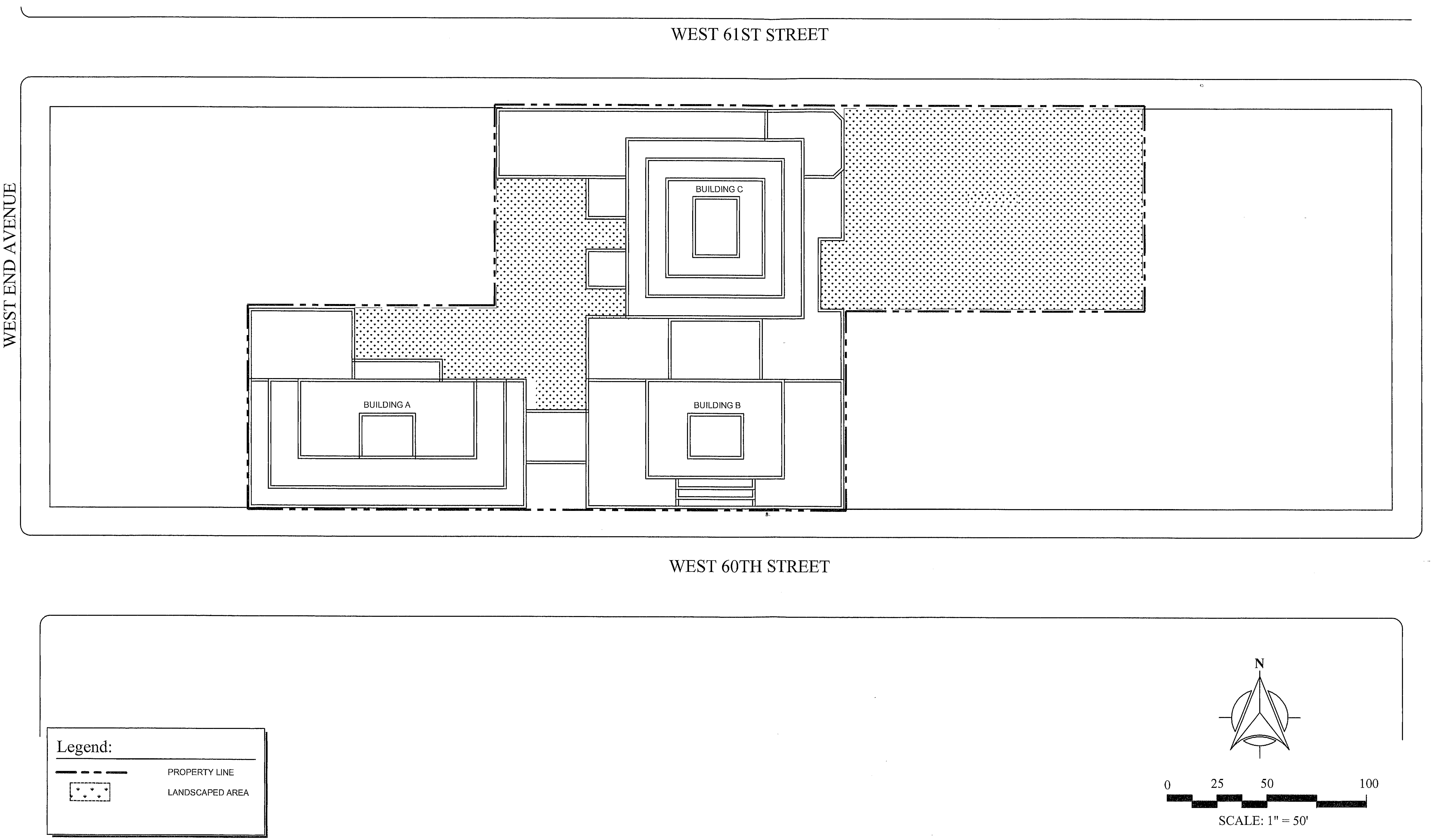
PROJECT No.
10321

FIGURE No.
2



Legend:

- – – PROPERTY LINE
- ▨ LANDSCAPED AREA

AKRF
Environmental Consultants
440 Park Avenue South, New York, NY 10016

West 61st Street Site
New York, New York

PLANNED DEVELOPMENT

DATE
04.20.05

SCALE
1:50

PROJECT No.
10321

FIGURE No.
3

APPENDIX A
HEALTH AND SAFETY PLAN

HEALTH AND SAFETY PLAN

WEST 61ST STREET SITE

New York, New York
AKRF Project Number: 10321

Prepared by:

AKRF

440 Park Avenue South, 7th Floor
New York, NY 10016
(212) 696-0670

Prepared for:

Algin Management Co., LLC
64-35 Yellowstone Blvd.
Forest Hills, NY 11375

APRIL 2005

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FIGURES

APPENDICES

1.0 INTRODUCTION

The Algin Properties/West 61st Street site (the project site or site) consists of the ten parcels located at the intersection of West 61st Street and West End Avenue in Manhattan, New York (Figure 1). Specifically, the study site consists of Block 1152, Lots 5, 8, 10, 11, 12, 13, part of 43, 52, 53, and 55. These parcels are currently occupied by vacant land, some of which is used for outdoor storage or parking lots. Residential, industrial, and commercial properties were present in the surrounding neighborhood.

The proposed development is shown on Figure 3. The proposed project includes the construction of three new buildings that would include parking and mechanical spaces at the cellar and subcellar levels; retail, residential and community use on the first floor; and residential use (rental and condominium) from the second floor up. Building A will be 9 floors, Building B will be 14 floors, and Building C will be 29 floors. The proposed project currently consists of excavation of all developed portions of the site to the bedrock surface, which varies from a depth of 10.5 to 40 feet below grade. The two undeveloped portions totaling approximately 23,000 square feet is not anticipated to be disturbed as part of general construction, other than landscaping. The excavation area will be sheeted along the perimeter.

A Phase I Environmental Site Assessment performed by AKRF, Inc. (AKRF) in June 2003 identified recognized environmental concerns for the site, including potential underground storage tanks. Based upon historic operations, the subsurface soils may contain organic or inorganic contaminants.

The remedial investigation will include the following tasks:

- A geophysical survey on Lots 13 and 43 to determine the presence of suspected underground storage tanks.
- An investigation of geophysical anomalies and removal of any underground storage tanks.
- A subsurface investigation, including soil and groundwater sampling and analysis, to characterize on-site soil and groundwater.

This environmental Health and Safety Plan (HASP) has been developed for implementation of site investigation activities conducted by all personnel on-site, both AKRF employees and others. This HASP does not discuss other routine health and safety issues common to general construction/excavation, including but not limited to slips, trips, falls, shoring, and other physical hazards.

All AKRF employees are directed that all work must be performed in accordance with the Company's Generic HASP and all OSHA applicable regulations for the work activities required for the project. All project personnel are furthermore directed that they are not permitted to enter Permit Required Confined Spaces (as defined by OSHA). For issues unrelated to contaminated materials, all non-AKRF employees are to be bound by all applicable OSHA regulations and any more stringent requirements specified by their employer in their corporate HASP or otherwise. AKRF is not responsible for providing oversight for issues unrelated to contaminated materials for non-employees. This oversight shall be the responsibility of the employer of that worker or other official designated by that employer.

2.0 HEALTH AND SAFETY GUIDELINES AND PROCEDURES

2.1 Hazard Evaluation

2.1.1 Hazards of Concern

Check all that apply		
(x) Organic Chemicals	(x) Inorganic Chemicals	( ) Radiological

( ) Biological	( ) Explosive/Flammable	( ) Oxygen Deficient Atmosphere
(x) Heat Stress	(x) Cold Stress	( ) Other
Comments: No personnel are permitted to enter permit confined spaces		

2.1.2 Physical Characteristics

Check all that apply		
(x) Liquid	(x) Solid	(x) Sludge
(x) Vapors	( ) Unknown	( ) Other
Comments:		

2.1.3 Hazardous Materials

Check all that apply					
Chemicals	**Solids**	**Sludges**	**Solvents**	**Oils**	**Other**
( ) Acids	(x) Ash	( ) Paints	( ) Halogens	(x) Transformer	( ) Lab
( ) Caustics	( ) Asbestos	( ) Metals	( ) Petroleum	( ) Other DF	( ) Pharm
( ) Pesticides	( ) Tailings	( ) POTW	( ) Other	(x) Motor or Hydraulic Oil	( ) Hospital
(x) Petroleum	( ) Other	( ) Other		( ) Other	( ) Rad
( ) Inks		(x) Petroleum sludge in tanks			( ) MGP
(x) PCBs					( ) Mold
(x) Metals					( ) Other
(x)Other: VOCs & SVOCs					

2.1.4 Chemicals of Concern

Chemicals	REL/PEL/STEL (ppm)	Health Hazards
Benzene	REL = 0.1 ppm PEL = 1 ppm STEL = 5 ppm	Irritation eyes, skin, nose, respiratory system; dizziness; headache, nausea, staggered gait; anorexia, lassitude, dermatitis; bone marrow depression, potential occupational carcinogen.
Toluene	REL = 100 ppm PEL = 200 ppm STEL = 300 ppm	Irritation eyes, nose; lassitude, confusion, euphoria, dizziness, headache; dilated pupils, lacrimation (discharge of tears); anxiety, muscle fatigue, insomnia; paresthesia; dermatitis; liver, kidney damage.

Chemicals	**REL/PEL/STEL (ppm)**	**Health Hazards**
Ethylbenzene	REL = 100 ppm PEL = 100 ppm	Irritation eyes, skin, mucous membrane; headache; dermatitis; narcosis, coma.
Xylenes	REL = 100 ppm PEL = 100 ppm	Irritation eyes, skin, nose, throat; dizziness, excitement, drowsiness, incoordination, staggering gait; corneal vacuolization; anorexia, nausea, vomiting, abdominal pain; dermatitis.
Naphthalene	REL = 10 ppm PEL = 10 ppm	Irritation eyes; headache, confusion, excitement, malaise; nausea, vomiting, abdominal pain; irritation bladder; profuse sweating; jaundice; hematuria (blood in the urine), renal shutdown; dermatitis, optical neuritis, corneal damage.
Lead	REL=0.1 mg/m^3 PEL=0.05 mg/m^3	Weak, lassitude, insomnia; facial pallor, pale eye, anorexia, low-weight, malnutrition, constipation, abdominal pain, colic; anemia; gingival lead line; tremors, paralysis writs and ankles; encephalopathy; kidney disease; irritation eyes; hypotension.
PCBs	REL = 0.001 mg/m^3 PEL = 0.5 mg/m^3	Irritation eyes, chloracne [skin]; liver damage; reproductive effects; [potential occupational carcinogen].
Particulate	PEL = 15 mg/m^3 (total) PEL = 5 mg/m^3 (respirable)	Irritation eyes, skin, throat, upper respiratory system.
Comments: REL = NIOSH Recommended Exposure Limit PEL = OSHA Permissible Exposure Limit STEL = OSHA Short Term Exposure Limit		

2.2 Designated Personnel

AKRF will appoint one of its on-site personnel as the Site Safety Officer (SSO). This individual will be responsible for the implementation of the HASP. The SSO will have a 4-year college degree in occupational safety or a related science/engineering field, and experience in implementation of air monitoring and hazardous materials sampling programs. Health and safety training required for the SSO and all field personnel is outlined in Section 2.3 of this HASP.

2.3 Training

All personnel who enter the work area while intrusive activities are being performed will have completed a 40-hour training course that meets OSHA requirements of 29 CFR Part 1910, Occupational Safety and Health Standards. All personnel shall also have up to date 8-hour refresher training. The training shall allow personnel to recognize and understand the potential hazards to health and safety. All field personnel must attend a training program, whose purpose is to:

- Make them aware of the potential hazards they may encounter;
- Provide the knowledge and skills necessary for them to perform the work with minimal risk to health and safety; Make them aware of the purpose and limitations of safety equipment; and
- Ensure that they can safely avoid or escape from emergencies.

Each member of the field crew will be instructed in the above objectives before he/she goes onto the site. A site safety meeting will be conducted at the start of the project. Additional meetings shall be conducted, as necessary, for new personnel working at the site.

2.4 Medical Surveillance Program

All AKRF and subcontractor personnel performing field work involving subsurface disturbance at the site are required to have passed a complete medical surveillance examination in accordance with 29 CFR 1910.120 (f). A physician's medical release for work will be confirmed by the SSO before an employee can begin site activities. The medical release will consider the type of work to be performed and the required PPE. The medical examination will, at a minimum, be provided annually and upon termination of hazardous waste site work.

2.5 Site Work Zones

During any activities involving subsurface disturbance, the work area will be divided into various zones to prevent the spread of contamination, ensure that proper protective equipment is donned, and provide an area for decontamination.

The Exclusion Zone is defined as the area where exposure to impacted media could be encountered. The Contamination Reduction Zone (CRZ) is the area where decontamination procedures take place and is located next to the Exclusion Zone. The Support is the zone area where support facilities such as vehicles, fire extinguisher, and first aid supplies are located. The emergency staging area (part of the Support Zone) is the area where all workers on-site would assemble in the event of an emergency. A summary of these areas is provided below. These zones may changed by SSO, depending on that day's activities. All field personnel will be informed of the location of these zones before work begins.

Task	**Exclusion Zone**	**CRZ**	**Support Zone**
Excavation and Tank Removal	10 ft from excavation	25 ft from excavation	As needed
Soil Borings	10 ft from drill rig	25 ft from drill rig	As needed
Groundwater Sampling	10 ft from monitoring well	As needed	As needed
Comments: Control measures such as "caution tape" and/or traffic cones will be placed around the perimeter of the work area when work is being done in a public area.			

2.6 Work Zone Air Monitoring

Real time air monitoring will be performed with the PID and particulate monitor during contaminated soil disturbance activities. Real time air monitoring will be performed with the combustible gas indicator and/or the multi-gas meter during tank removal activities. Measurements will be taken prior to commencement of work and continuously during the work. Measurements will be made as close to the workers as practicable and at the breathing height of the workers. The SSO shall set up the equipment and confirm that it is working properly. His/her designee may oversee the air measurements during the day. The initial measurement for the day will be performed before the start of work and will establish the background level for that day. The final measurement for the day will be performed after the end of work. The action levels and required responses are listed in the table Section 2.6.4.

2.6.1 Volatile Organic Compounds

A photoionization detector (PID) will be used to perform air monitoring during soil and groundwater sampling and soil disturbance activities conducted at the site to determine airborne levels of total VOCs. The PID will be calibrated daily with a 100 ppm isobutylene standard. The PID will be capable of calculating 15-minute running average concentrations and will be equipped with an audible alarm to indicate the exceedance of an action level. The VOC work zone action levels and required responses are listed in the table below.

2.6.2 Dust Particulates

A particulate monitor will be used to measure airborne levels of respirable particulates (less than 10 microns) during soil disturbing activities. The particulate monitor will be used in accordance with the manufacturer's specifications. The dust particulate work zone action levels and required responses are listed in the table in Section 2.6.4.

2.6.3 Oxygen and Combustible Gases

A combined combustible gas indicator and oxygen meter (CGI/O_2) or a multi-gas meter that measures the lower explosion limit of combustible gases (LEL), oxygen (O_2), carbon monoxide (CO) and hydrogen sulfide (H_2S) will be used to measure oxygen and combustible gasses during tank removal. The combustible gas indicator and/or the multi-gas meter will be calibrated daily in accordance with manufacturers' specifications. The CGI and O_2 work zone action levels and required responses are listed in the table in Section 2.6.4.

2.6.4 Work Zone Action Levels and Response Actions

Instrument	Task to be monitored	Action Level (Note 1)	Response Action
PID	All soil disturbance tasks	Less than 10 ppm in breathing zone.	Level D or D-Modified
		Between 10 and 500 ppm	Level C
		More than 500 ppm	Stop work. Resume work when readings are less than 500 ppm.
Particulate monitor	All soil disturbance tasks	Less than 5 mg/m^3	Level D
		Between 5 mg/m^3 and 125 mg/m^3	Level C. Apply dust suppression measures. If < 2.5 mg/m^3, resume work using Level D. Otherwise, use Level C.
		Above 125 mg/m^3	Stop work. Apply additional dust suppression measures. Resume work when less than 125 mg/m^3.
Combustible Gas Indicator (CGI) or Equivalent (Note 2)	Tank Removal	Less than 20% LEL	Continue work.
		Between 20% and 80% LEL	Stop work. Resume work when less than 20% LEL.
		Above 80% LEL	Evacuate Exclusion Zone.
Oxygen Monitor	Tank Removal	Above 19.5%	Continue work.
		Below 19.5%	Stop work. Resume work when greater than 19.5%

Notes:
1 – 15-minute time-weighted average except for CGI, which is instantaneous reading.
2 – CGI or equivalent must measure oxygen (O_2), carbon monoxide (CO), hydrogen sulfide (H_2S) and combustible gas (LEL).

ppm – parts per million
mg/m^3 – milligrams per cubic meter
LEL – lower explosive limit

2.7 Community Air Monitoring

Perimeter community air monitoring for VOCs and dust particulates will be conducted during soil disturbance activities. At the start of work, air monitoring stations will be established upwind and downwind of the work activities.

2.7.1 Volatile Organic Compounds

Monitoring for VOCs will be conducted using a photoionization detector (PID). Monitoring for VOCs at the upwind station will be conducted at the start of each workday and every time the wind direction changes to establish background conditions. Monitoring for VOCs at the downwind station will be continuous during soil excavation. If readings approach the Work Zone Action Levels in the table in Section 2.6.4, the location of the community monitoring downwind station will be moved to the downwind perimeter of the site. Background readings and any readings that trigger response actions will be recorded in the project logbook, which will be available on-site for NYS DEC or NYSDOH review. The VOC community action levels and required responses are listed in the table in Section 2.7.3.

Downwind odor monitoring will also be performed during the excavation and loading of contaminated soil. If nuisance odors are noted, corrective actions will be implemented.

2.7.2 Dust Particulates

Community air monitoring for dust particulates will be conducted using a real time particulate monitor that measures the concentration of airborne respirable particulates less than 10 micrometers in size (PM_{10}). The monitor will be capable of calculating 15-minute running average concentrations and will be equipped with an audible alarm to indicate exceedance of action levels. Monitoring for particulates at the upwind location will be conducted at the start of each workday and every time the wind direction changes to establish background conditions. Monitoring at the downwind station will be continuous during soil excavation. If readings approach the Work Zone Action Levels in the table in Section 2.6.4, the location of the community monitoring downwind station will be moved to the downwind perimeter of the site. Background readings and any readings that trigger response actions will be recorded in the project logbook, which will be available on site for NYS DEC or NYSDOH review. The dust particulate community action levels and required responses are listed in the table in Section 2.7.3.

2.7.3 Community Action Levels and Response Actions

Instrument	**Task to be Monitored**	**Action Level**	**Response Action**
PID	All soil disturbance tasks	Less than 5 ppm above background at downwind perimeter.	Continue work
		Between 10 and 25 ppm above background at downwind perimeter.	Stop work and continue monitoring. If organic vapor levels (instantaneous reading) steadily decrease to less than 5 ppm, resume work. If organic vapor levels persists at >5 ppm, identify source and take steps to abate emissions. Work can resume if organic vapor level (15-minute average) is below 5 ppm at 200 feet downwind of work zone or half the distance to the nearest potential receptor, whichever is closer.
		More than 25 ppm above background at downwind perimeter.	Shut down job.
Particulate monitor	All soil disturbance tasks	Less than 100 µg/m³ above background (upwind perimeter) at downwind perimeter.	Continue work.
		Between 100 µg/m³ and 150 µg/m³ above background (upwind perimeter) at downwind perimeter.	Apply dust suppression measures. Work can continue provided downwind PM_{10} particulate levels do not exceed 150 µg/m³ above background levels and no visible dust is migrating from the work area.
		Greater than 150µg/m³ above background (upwind perimeter) at downwind perimeter after dust suppression.	Stop work. Apply additional dust suppression measures. Resume work when less than 150 µg/m³ above background levels and no visible dust is migrating from the work area.

Notes:
ppm – pats per million
µg/m³ – micrograms per cubic meter

2.8 Personal Protection Equipment

The personal protection equipment required for various kinds of site investigation tasks are based on 29 CFR 1910.120, Hazardous Waste Operations and Emergency Response Appendix B, "General Description and Discussion of the Levels of Protection and Protective Gear."

AKRF field personnel and other site personnel will wear, at a minimum, Level D personal protective equipment (PPE). The protection will be based on the air monitoring described in Section 2.6 of this HASP.

LEVEL OF PROTECTION and PPE		**Soil Boring**
Level D (x) Steel Toe Shoes (x) Hard Hat (within 25 ft of drill rig/excavator) (x) Work Gloves	(x) Safety Glasses ( ) Face Shield (x) Ear Plugs (within 25 ft of drill rig/excavator) (x) Nitrile Gloves	Yes
Level C ***(in addition to Level D)*** ( ) Half-Face Respirator (x) Full Face Respirator ( ) Full-Face PAPR	( ) Particulate Cartridge ( ) Organic Cartridge (x) Dual Organic/Particulate Cartridge	If PID > 10 ppm (breathing zone)
Comments: Cartridges to be changed out at least once per shift unless warranted beforehand (e.g., more difficult to breath or any odors detected).		

2.9 General Work Practices

To protect the health and safety of the field personnel, field personnel will adhere to the guidelines listed below during activities involving subsurface disturbance:

- Eating, drinking, chewing gum or tobacco, and smoking are prohibited, except in designated areas on the site. These areas will be designated by the SSO.
- Workers must wash their hands and face thoroughly on leaving the work area and before eating, drinking, or any other such activity.
- The workers should shower as soon as possible after leaving the site. Contact with contaminated or suspected surfaces should be avoided.
- The buddy system should always be used; each buddy should watch for signs of fatigue, exposure, and heat/cold stress.

3.0 EMERGENCY PROCEDURES AND EMERGENCY RESPONSE PLAN

The field crew will be equipped with emergency equipment, such as a first aid kit and disposable eye washes. In the case of a medical emergency, the SSO will determine the nature of the emergency and he/she will have someone call for an ambulance, if needed. If the nature of the injury is not serious, i.e., the person can be moved without expert emergency medical personnel, he/she should be driven to a hospital by on-site personnel. Directions to the hospital are provided below, and a hospital route map is attached.

3.1 Hospital Directions

Hospital Name:	St. Luke's Roosevelt Hospital
Phone Number:	(212) 523-4000
Address/Location:	1000 10th Avenue, New York, NY The entrance to the Emergency Room is on West 59th Street between 10th Avenue (Amsterdam Avenue) and 11th Avenue (West End Avenue).
Directions:	Go EAST on West 60th Street Turn RIGHT onto Columbus Avenue (9th Avenue) Turn RIGHT onto West 59th Street

3.2 Emergency Contacts

Company	Individual Name	Title	Contact Number
AKRF	Michelle Lapin	Project Director	646-388-9520 (office)
	Kate Brunner	Project Manager	646-388-9525 (office) 917-612-3990 (cell)
	TBD	SSO	TBD
Algin Management	TBD	Client	TBD
(subcontractors: driller, tank removal, etc.)	TBD	TBD	TBD
Ambulance, Fire Department & Police Department	-	-	911
NYS DEC Spill Hotline	-	-	800-457-7362

4.0 APPROVAL & ACKNOWLEDGMENTS OF HASP

APPROVAL

Signed: Date:

AKRF Project Manager

Signed: Date

AKRF Health and Safety Officer

Below is an affidavit that must be signed by all workers who enter the site. A copy of the HASP must be on-site at all times and will be kept by the SSO.

AFFIDAVIT

I,_________________________(name), of________________________________(company name), have read the Health and Safety Plan (HASP) for the Algin Properties/ West 60th Street site. I agree to conduct all on-site work in accordance with the requirements set forth in this HASP and understand that failure to comply with this HASP could lead to my removal from the site.

Signed:	Company:	Date:
Signed:	Company:	Date:
Signed:	Company:	Date:
Signed:	Company:	Date:
Signed:	Company:	Date:
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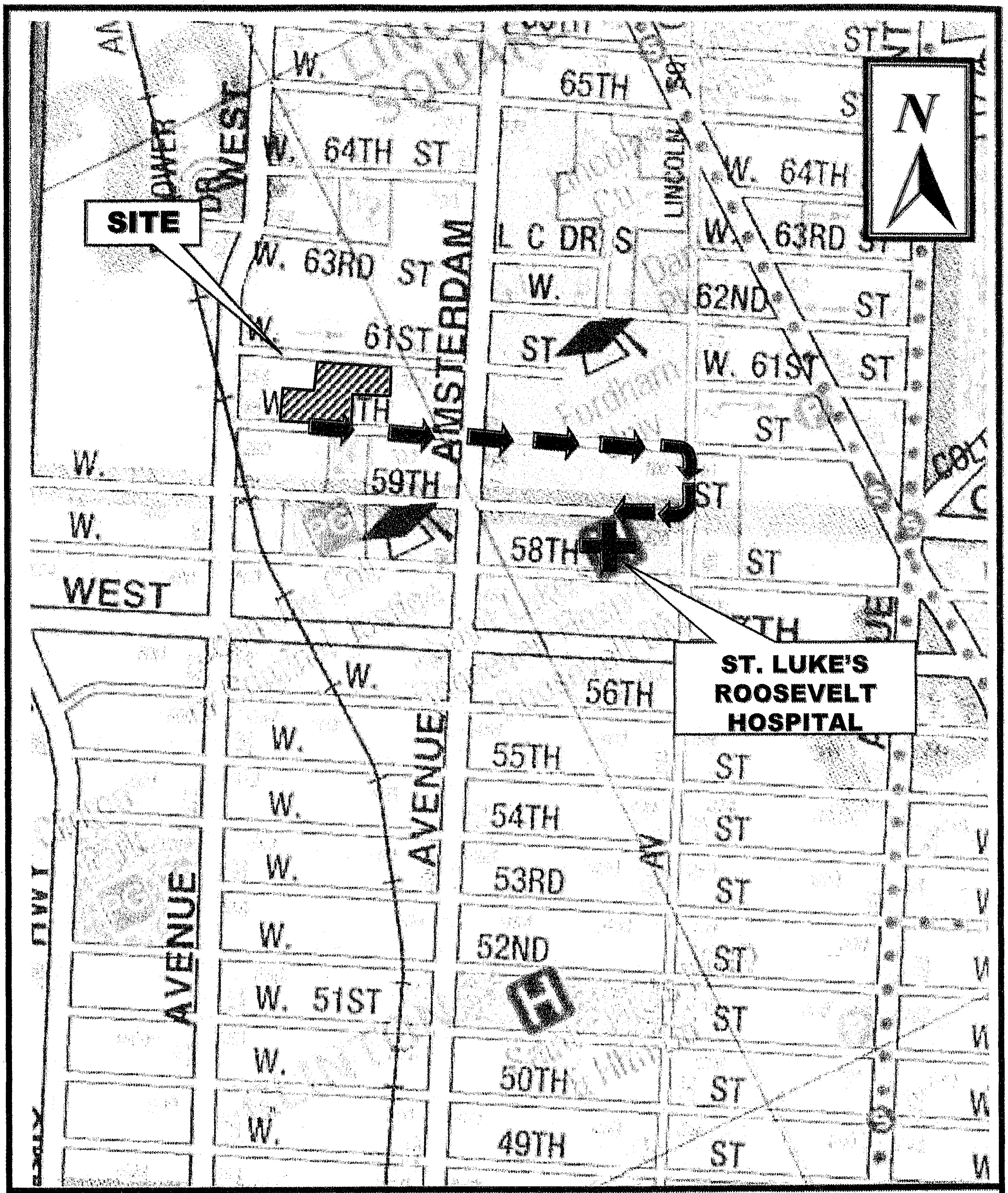
FIGURES



West 61st Street Site
New York, New York

PROJECT SITE MAP
AND NEAREST HOSPITAL

AKRF, Inc.

Environmental Consultants
440 Park Avenue S., New York, New York 10016

DATE	April 2005
DRAWING No.	
PROJECT No.	10321
FIGURE No.	1

APPENDIX A

POTENTIAL HEALTH EFFECTS FROM ON-SITE CONTAMINANTS

ATSDR
AGENCY FOR TOXIC SUBSTANCES
AND DISEASE REGISTRY

BENZENE
CAS # 71-43-2

Agency for Toxic Substances and Disease Registry ToxFAQs September 1997

This fact sheet answers the most frequently asked health questions (FAQs) about benzene. For more information, call the ATSDR Information Center at 1-888-422-8737. This fact sheet is one in a series of summaries about hazardous substances and their health effects. This information is important because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

HIGHLIGHTS: Benzene is a widely used chemical formed from both natural processes and human activities. Breathing benzene can cause drowsiness, dizziness, and unconsciousness; long-term benzene exposure causes effects on the bone marrow and can cause anemia and leukemia. Benzene has been found in at least 813 of the 1,430 National Priorities List sites identified by the Environmental Protection Agency (EPA).

What is benzene?
(Pronounced bĕn′zēn′)

Benzene is a colorless liquid with a sweet odor. It evaporates into the air very quickly and dissolves slightly in water. It is highly flammable and is formed from both natural processes and human activities.

Benzene is widely used in the United States; it ranks in the top 20 chemicals for production volume. Some industries use benzene to make other chemicals which are used to make plastics, resins, and nylon and synthetic fibers. Benzene is also used to make some types of rubbers, lubricants, dyes, detergents, drugs, and pesticides. Natural sources of benzene include volcanoes and forest fires. Benzene is also a natural part of crude oil, gasoline, and cigarette smoke.

What happens to benzene when it enters the environment?

- ☐ Industrial processes are the main source of benzene in the environment.
- ☐ Benzene can pass into the air from water and soil.
- ☐ It reacts with other chemicals in the air and breaks down within a few days.
- ☐ Benzene in the air can attach to rain or snow and be carried back down to the ground.
- ☐ It breaks down more slowly in water and soil, and can pass through the soil into underground water.
- ☐ Benzene does not build up in plants or animals.

How might I be exposed to benzene?

- ☐ Outdoor air contains low levels of benzene from tobacco smoke, automobile service stations, exhaust from motor vehicles, and industrial emissions.
- ☐ Indoor air generally contains higher levels of benzene from products that contain it such as glues, paints, furniture wax, and detergents.
- ☐ Air around hazardous waste sites or gas stations will contain higher levels of benzene.
- ☐ Leakage from underground storage tanks or from hazardous waste sites containing benzene can result in benzene contamination of well water.
- ☐ People working in industries that make or use benzene may be exposed to the highest levels of it.
- ☐ A major source of benzene exposures is tobacco smoke.

How can benzene affect my health?

Breathing very high levels of benzene can result in death, while high levels can cause drowsiness, dizziness, rapid heart rate, headaches, tremors, confusion, and unconsciousness. Eating or drinking foods containing high levels of benzene can cause vomiting, irritation of the stomach, dizziness, sleepiness, convulsions, rapid heart rate, and death.

The major effect of benzene from long-term (365 days or longer) exposure is on the blood. Benzene causes harmful effects on the bone marrow and can cause a decrease in red blood cells leading to anemia. It can also cause excessive bleeding and can affect the immune system, increasing the chance for infection.

Some women who breathed high levels of benzene for many months had irregular menstrual periods and a decrease in the size of their ovaries. It is not known whether benzene exposure affects the developing fetus in pregnant women or fertility in men.

Animal studies have shown low birth weights, delayed bone formation, and bone marrow damage when pregnant animals breathed benzene.

How likely is benzene to cause cancer?

The Department of Health and Human Services (DHHS) has determined that benzene is a known human carcinogen. Long-term exposure to high levels of benzene in the air can cause leukemia, cancer of the blood-forming organs.

Is there a medical test to show whether I've been exposed to benzene?

Several tests can show if you have been exposed to benzene. There is test for measuring benzene in the breath; this test must be done shortly after exposure. Benzene can also be measured in the blood, however, since benzene disappears rapidly from the blood, measurements are accurate only for recent exposures.

In the body, benzene is converted to products called metabolites. Certain metabolites can be measured in the urine. However, this test must be done shortly after exposure and is not a reliable indicator of how much benzene you have been exposed to, since the metabolites may be present in urine from other sources.

Has the federal government made recommendations to protect human health?

The EPA has set the maximum permissible level of benzene in drinking water at 0.005 milligrams per liter (0.005 mgL). The EPA requires that spills or accidental releases into the environment of 10 pounds or more of benzene be reported to the EPA.

The Occupational Safety and Health Administration (OSHA) has set a permissible exposure limit of 1 part of benzene per million parts of air (1 ppm) in the workplace during an 8-hour workday, 40-hour workweek.

Glossary

Anemia: A decreased ability of the blood to transport oxygen.

Carcinogen: A substance with the ability to cause cancer.

CAS: Chemical Abstracts Service.

Chromosomes: Parts of the cells responsible for the development of hereditary characteristics.

Metabolites: Breakdown products of chemicals.

Milligram (mg): One thousandth of a gram.

Pesticide: A substance that kills pests.

References

This ToxFAQs information is taken from the 1997 Toxicological Profile for Benzene (update) produced by the Agency for Toxic Substances and Disease Registry, Public Health Service, U.S. Department of Health and Human Services, Public Health Service in Atlanta, GA.

Where can I get more information? For more information, contact the Agency for Toxic Substances and Disease Registry, Division of Toxicology, 1600 Clifton Road NE, Mailstop E-29, Atlanta, GA 30333. Phone: 1-888-422-8737, FAX: 404-498-0093. ToxFAQs Internet address via WWW is http://www.atsdr.cdc.gov/toxfaq.html ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns.

ATSDR
AGENCY FOR TOXIC SUBSTANCES
AND DISEASE REGISTRY

ETHYLBENZENE
CAS # 100-41-4

Agency for Toxic Substances and Disease Registry ToxFAQs June 1999

This fact sheet answers the most frequently asked health questions (FAQs) about ethylbenzene. For more information, call the ATSDR Information Center at 1-888-422-8737. This fact sheet is one in a series of summaries about hazardous substances and their health effects. It's important you understand this information because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

HIGHLIGHTS: Ethylbenzene is a colorless liquid found in a number of products including gasoline and paints. Breathing very high levels can cause dizziness and throat and eye irritation. Ethylbenzene has been found in at least 731 of the 1,467 National Priorities List sites identified by the Environmental Protection Agency (EPA).

What is ethylbenzene?
(Pronounced ĕth′ əl bĕn′ zēn′)

Ethylbenzene is a colorless, flammable liquid that smells like gasoline. It is found in natural products such as coal tar and petroleum and is also found in manufactured products such as inks, insecticides, and paints.

Ethylbenzene is used primarily to make another chemical, styrene. Other uses include as a solvent, in fuels, and to make other chemicals.

What happens to ethylbenzene when it enters the environment?

☐ Ethylbenzene moves easily into the air from water and soil.

☐ It takes about 3 days for ethylbenzene to be broken down in air into other chemicals.

☐ Ethylbenzene may be released to water from industrial discharges or leaking underground storage tanks.

☐ In surface water, ethylbenzene breaks down by reacting with other chemicals found naturally in water.

☐ In soil, it is broken down by soil bacteria.

How might I be exposed to ethylbenzene?

☐ Breathing air containing ethylbenzene, particularly in areas near factories or highways.

☐ Drinking contaminated tap water.

☐ Working in an industry where ethylbenzene is used or made.

☐ Using products containing it, such as gasoline, carpet glues, varnishes, and paints.

How can ethylbenzene affect my health?

Limited information is available on the effects of ethylbenzene on people's health. The available information shows dizziness, throat and eye irritation, tightening of the chest, and a burning sensation in the eyes of people exposed to high levels of ethylbenzene in air.

Animals studies have shown effects on the nervous system, liver, kidneys, and eyes from breathing ethylbenzene in air.

How likely is ethylbenzene to cause cancer?

The EPA has determined that ethylbenzene is not classifiable as to human carcinogenicity.

No studies in people have shown that ethylbenzene exposure can result in cancer. Two available animal studies suggest that ethylbenzene may cause tumors.

How can ethylbenzene affect children?

Children may be exposed to ethylbenzene through inhalation of consumer products, including gasoline, paints, inks, pesticides, and carpet glue. We do not know whether children are more sensitive to the effects of ethylbenzene than adults.

It is not known whether ethylbenzene can affect the development of the human fetus. Animal studies have shown that when pregnant animals were exposed to ethylbenzene in air, their babies had an increased number of birth defects.

How can families reduce the risk of exposure to ethylbenzene?

Exposure to ethylbenzene vapors from household products and newly installed carpeting can be minimized by using adequate ventilation.

Household chemicals should be stored out of reach of children to prevent accidental poisoning. Always store household chemicals in their original containers; never store them in containers children would find attractive to eat or drink from, such as old soda bottles. Gasoline should be stored in a gasoline can with a locked cap.

Sometimes older children sniff household chemicals, including ethylbenzene, in an attempt to get high. Talk with your children about the dangers of sniffing chemicals.

Is there a medical test to show whether I've been exposed to ethylbenzene?

Ethylbenzene is found in the blood, urine, breath, and some body tissues of exposed people. The most common way to test for ethylbenzene is in the urine. This test measures substances formed by the breakdown of ethylbenzene. This test needs to be done within a few hours after exposure occurs, because the substances leave the body very quickly.

These tests can show you were exposed to ethylbenzene, but cannot predict the kind of health effects that might occur.

Has the federal government made recommendations to protect human health?

The EPA has set a maximum contaminant level of 0.7 milligrams of ethylbenzene per liter of drinking water (0.7 mg/L).

The EPA requires that spills or accidental releases into the environment of 1,000 pounds or more of ethylbenzene be reported to the EPA.

The Occupational Safety and Health Administration (OSHA) has set an occupational exposure limit of 100 parts of ethylbenzene per million parts of air (100 ppm) for an 8-hour workday, 40-hour workweek.

References

Agency for Toxic Substances and Disease Registry (ATSDR). 1999. Toxicological profile for ethylbenzene. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service.

Where can I get more information? For more information, contact the Agency for Toxic Substances and Disease Registry, Division of Toxicology, 1600 Clifton Road NE, Mailstop E-29, Atlanta, GA 30333. Phone: 1-888-422-8737, FAX: 404-498-0093. ToxFAQs Internet address via WWW is http://www.atsdr.cdc.gov/toxfaq.html ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns.

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FUEL OILS

CAS # 8008-20-6, 70892-10-3, 68476-30-2, 68476-34-6, 68476-31-3

Agency for Toxic Substances and Disease Registry ToxFAQs September 1996

This fact sheet answers the most frequently asked health questions (FAQs) about fuel oils. For more information, call the ATSDR Information Center at 1-888-422-8737. This fact sheet is one in a series of summaries about hazardous substances and their health effects. It's important you understand this information because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

SUMMARY: Fuel oils are liquid mixtures produced from petroleum, and their use mostly involves burning them as fuels. Drinking or breathing fuel oils may cause nausea or nervous system effects. However, exposure under normal use conditions is not likely to be harmful. Fuel oils have been found in at least 26 of the 1,430 National Priorities List sites identified by the Environmental Protection Agency (EPA).

What are fuel oils?
(Pronounced fyo͞o′əl oilz)

Fuel oils are a variety of yellowish to light brown liquid mixtures that come from crude petroleum. Some chemicals found in fuel oils may evaporate easily, while others may more easily dissolve in water.

Fuel oils are produced by different petroleum refining processes, depending on their intended uses. Fuel oils may be used as fuel for engines, lamps, heaters, furnaces, and stoves, or as solvents.

Some commonly found fuel oils include kerosene, diesel fuel, jet fuel, range oil, and home heating oil. These fuel oils differ from one another by their hydrocarbon compositions, boiling point ranges, chemical additives, and uses.

What happens to fuel oils when they enter the environment?

- ❑ Some chemicals found in fuel oils may evaporate into the air from open containers or contaminated soil or water.
- ❑ Some chemicals found in fuel oils may dissolve in water after spills to surface waters or leaks from underground storage tanks.
- ❑ Some chemicals found in fuel oils may stick to particles in water, which will eventually cause them to settle to the bottom sediment.
- ❑ Some of the chemicals found in fuel oils may be broken down slowly in air, water, and soil by sunlight or small organisms.
- ❑ Some of the chemicals found in fuel oils may build up significantly in plants and animals.

How might I be exposed to fuel oils?

- ❑ Using a home kerosene heater or stove, or using fuel oils at work.
- ❑ Breathing air in home or building basements that has been contaminated with fuel oil vapors entering from the soil.
- ❑ Drinking or swimming in water that has been contaminated with fuel oils from a spill or a leaking underground storage tank.
- ❑ Touching soil contaminated with fuel oils.
- ❑ Using fuel oils to wash paint or grease from skin or equipment.

How can fuel oils affect my health?

Little information is available about the health effects that may be caused by fuel oils. People who use kerosene stoves for cooking do not seem to have any health problems related to their exposure.

Breathing some fuel oils for short periods may cause nausea, eye irritation, increased blood pressure, headache, light-headedness, loss of appetite, poor coordination, and difficulty concentrating. Breathing diesel fuel vapors for long periods may cause kidney damage and lower your blood's ability to clot.

Drinking small amounts of kerosene may cause vomiting, diarrhea, coughing, stomach swelling and cramps, drowsiness, restlessness, painful breathing, irritability, and unconsciousness. Drinking large amounts of kerosene may cause convulsions, coma, or death. Skin contact with kerosene for short periods may cause itchy, red, sore, or peeling skin.

How likely are fuel oils to cause cancer?

The International Agency for Research on Cancer (IARC) has determined that some fuel oils (heavy) may possibly cause cancer in humans, but for other fuel oils (light) there is not enough information to make a determination. IARC has also determined that occupational exposures to fuel oils during petroleum refining are probably carcinogenic in humans.

Some studies with mice have suggested that repeated contact with fuel oils may cause liver or skin cancer. However, other mouse studies have found this not to be the case. No studies are available in other animals or in people on the carcinogenic effects of fuel oils.

Is there a medical test to show whether I've been exposed to fuel oils?

There is no medical test that shows if you have been exposed to fuel oils. Tests are available to determine if some of the chemicals commonly found in fuel oils are in your blood. However, the presence of these chemicals in blood may not necessarily mean that you have been exposed to fuel oils.

Has the federal government made recommendations to protect human health?

The Occupational Safety and Health Administration (OSHA) and the Air Force Office of Safety and Health (AFOSH) have set a permissible exposure level (PEL) of 400 parts of petroleum distillates per million parts of air (400 ppm) for an 8-hour workday, 40-hour workweek.

The National Institute for Occupational Safety and Health (NIOSH) recommends that average workplace air levels not exceed 350 milligrams of petroleum distillates per cubic meter of air (350 mg/m^3) for a 40-hour workweek.

The Department of Transportation (DOT) lists fuel oils as hazardous materials and, therefore, regulates their transportation.

Glossary

Carcinogenic: Able to cause cancer.
CAS: Chemical Abstracts Service.
Evaporate: To change into a vapor or a gas.
Hydrocarbon: Any compound made up of hydrogen and carbon.
Milligram (mg): One thousandth of a gram.
ppm: Parts per million.
Sediment: Mud and debris that have settled to the bottom of a body of water.

References

Agency for Toxic Substances and Disease Registry (ATSDR). 1995. Toxicological profile for fuel oils. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service.

Where can I get more information? For more information, contact the Agency for Toxic Substances and Disease Registry, Division of Toxicology, 1600 Clifton Road NE, Mailstop E-29, Atlanta, GA 30333. Phone:1-888-422-8737, FAX: 404-498-0093. ToxFAQs Internet address via WWW is http://www.atsdr.cdc.gov/toxfaq.html ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns.

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AUTOMOTIVE GASOLINE

CAS # 8006-61-9

Agency for Toxic Substances and Disease Registry ToxFAQs September 1996

This fact sheet answers the most frequently asked health questions (FAQs) about automobile gasoline. For more information, call the ATSDR Information Center at 1-888-422-8737. This fact sheet is one in a series of summaries about hazardous substances and their health effects. This information is important because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

SUMMARY: Exposure to automotive gasoline most likely occurs from breathing its vapor at a service station while filling a car's fuel tank. At high levels, automotive gasoline is irritating to the lungs when breathed in and irritating to the lining of the stomach when swallowed. Exposure to high levels may also cause harmful effects to the nervous system. Automotive gasoline has been found in at least 23 of the 1,430 National Priorities List sites identified by the Environmental Protection Agency (EPA).

What is automotive gasoline?

(Pronounced ô′tə-mō′tĭv găs′ə-lēn′)

The gasoline discussed in this fact sheet is automotive used as a fuel for engines in cars. Gasoline is a colorless, pale brown, or pink liquid, and is very flammable.

Gasoline is a manufactured mixture that does not exist naturally in the environment. Gasoline is produced from petroleum in the refining process.

Typically, gasoline contains more than 150 chemicals, including small amounts of benzene, toluene, xylene, and sometimes lead. How the gasoline is made determines which chemicals are present in the gasoline mixture and how much of each is present. The actual composition varies with the source of the crude petroleum, the manufacturer, and the time of year.

What happens to automotive gasoline when it enters the environment?

- ☐ Small amounts of the chemicals present in gasoline evaporate into the air when you fill the gas tank in your car or when gasoline is accidentally spilled onto surfaces and soils or into surface waters.
- ☐ Other chemicals in gasoline dissolve in water after spills to surface waters or underground storage tank leaks into the groundwater.
- ☐ In surface releases, most chemicals in gasoline will probably evaporate; others may dissolve and be carried away by water; a few will probably stick to soil.
- ☐ The chemicals that evaporate are broken down by sunlight and other chemicals in the air.
- ☐ The chemicals that dissolve in water also break down quickly by natural processes.

How might I be exposed to automotive gasoline?

- ☐ Breathing vapors at a service station when filling the car's fuel tank is the most likely way to be exposed.
- ☐ Working at a service station.
- ☐ Using equipment that runs on gasoline, such as a lawn mower.
- ☐ Drinking contaminated water.
- ☐ Being close to a spot where gasoline has spilled or leaked into the soil.

How can automotive gasoline affect my health?

Many of the harmful effects seen after exposure to gasoline are due to the individual chemicals in the gasoline mixture, such as benzene and lead. Inhaling or swallowing large amounts of gasoline can cause death.

Inhaling high concentrations of gasoline is irritating to the lungs when breathed in and irritating to the lining of the stomach when swallowed. Gasoline is also a skin irritant. Breathing in high levels of gasoline for short periods or swallowing large amounts of gasoline may also cause harmful effects on the nervous system.

Serious nervous system effects include coma and the inability to breathe, while less serious effects include dizziness and headaches.

There is not enough information available to determine if gasoline causes birth defects or affects reproduction.

How likely is automotive gasoline to cause cancer?

The Department of Health and Human Services (DHHS) and the International Agency for Research on Cancer (IARC) have not classified automotive gasoline for carcinogenicity. Automotive gasoline is currently undergoing review by the EPA for cancer classification.

Some laboratory animals that breathed high concentrations of unleaded gasoline vapors continuously for 2 years developed liver and kidney tumors. However, there is no evidence that exposure to gasoline causes cancer in humans.

Is there a medical test to show whether I've been exposed to automotive gasoline?

Laboratory tests are available that can measure elevated blood or urine levels of lead (as an indication of exposure to leaded gasoline only), benzene, or other substances that may result from exposure to gasoline or other sources. These methods are sensitive enough to measure background levels and levels where health effects may occur. These tests aren't available in most doctors' offices, but can be done at special laboratories that have the right equipment.

Has the federal government made recommendations to protect human health?

The EPA has established many regulations to control air pollution. These are designed to protect the public from the possible harmful health effects of gasoline.

The American Conference of Governmental Industrial Hygienists (ACGIH) set a maximum level of 890 milligrams of gasoline per cubic meter of air (890 mg/m^3) for an 8-hour workday, 40-hour workweek.

Glossary

Carcinogenicity: Ability to cause cancer.

CAS: Chemical Abstracts Service.

Crude petroleum: Petroleum that has not been processed.

Dissolve: To disappear gradually.

Evaporate: To change into a vapor or a gas.

Irritant: A substance that causes an abnormal reaction.

Mixture: A combination of two or more components.

Refining process: The process by which petroleum is purified to form gasoline.

Tumor: An abnormal mass of tissue.

References

Agency for Toxic Substances and Disease Registry (ATSDR). 1995. Toxicological profile for automotive gasoline. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service.

Where can I get more information? For more information, contact the Agency for Toxic Substances and Disease Registry, Division of Toxicology, 1600 Clifton Road NE, Mailstop E-29, Atlanta, GA 30333. Phone: 1-888-422-8737, FAX: 404-498-0093. ToxFAQs Internet address via WWW is http://www.atsdr.cdc.gov/toxfaq.html ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns.

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HYDRAULIC FLUIDS

**CAS # 55957-10-3; 68937-40-6; 50815-84-4; 55962-27-1;
66594-31-8; 63848-94-2; 107028-44-4; 28777-70-0**

Agency for Toxic Substances and Disease Registry ToxFAQs September 1997

This fact sheet answers the most frequently asked health questions (FAQs) about hydraulic fluids. For more information, call the ATSDR Information Center at 1-888-422-8737. This fact sheet is one in a series of summaries about hazardous substances and their health effects. This information is important because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

HIGHLIGHTS: Exposure to hydraulic fluids occurs mainly in the workplace. Drinking certain types of hydraulic fluids can cause death in humans, and swallowing or inhaling certain types of hydraulic fluids has caused nerve damage in animals. Contact with some types of hydraulic fluids can irritate your skin or eyes. These substances have been found in at least 10 of the 1,428 National Priorities List sites identified by the Environmental Protection Agency (EPA).

What are hydraulic fluids?

(Pronounced hī-drô′lĭk flo͞o′ĭdz)

Hydraulic fluids are a large group of liquids made of many kinds of chemicals. They are used in automobile automatic transmissions, brakes, and power steering; fork lift trucks; tractors; bulldozers; industrial machinery; and airplanes. The three most common types of hydraulic fluids are mineral oil, organophosphate ester, and polyalphaolefin. Some of the trade names for hydraulic fluids include Durad®, Fyrquel®, Skydrol®, Houghton-Safe®, Pydraul®, Reofos®, Reolube®, and Quintolubric®. (Use of trade names is for identification only and does not imply endorsement by the Agency for Toxic Substances and Disease Registry, the Public Health Service, or the U.S. Department of Health and Human Services.)

Some hydraulic fluids have a bland, oily smell and others have no smell; some will burn and some will not burn. Certain hydraulic fluids are produced from crude oil and others are manufactured.

What happens to hydraulic fluids when they enter the environment?

☐ Hydraulic fluids can enter the environment from spills, leaks in machines that use them, or from storage areas and waste sites.

☐ If spilled on soil, some of the ingredients in hydraulic fluids will stay on top and others will sink into the groundwater.

☐ In water, some hydraulic fluids' ingredients will transfer to the bottom and can stay there for more than a year.

☐ Certain chemicals in hydraulic fluids may break down in air, soil, or water, but how much breaks down isn't known.

☐ Fish may contain some hydraulic fluids if they live in contaminated water.

How might I be exposed to hydraulic fluids?

☐ Touching or swallowing hydraulic fluids.

☐ Breathing hydraulic fluids in the air near machines where hydraulic fluids are used.

☐ Touching contaminated water or soil near hazardous waste sites or industrial manufacturing facilities that use or make hydraulic fluids.

How can hydraulic fluids affect my health?

Little is known about how hydraulic fluids can affect your health. Since hydraulic fluids are actually mixtures of chemicals, some of the effects seen may be caused by additives in the hydraulic fluids.

In people, the effects of breathing air with high levels of hydraulic fluids are not known. Drinking large amounts of some types of hydraulic fluids can cause pneumonia, intestinal bleeding, or death in humans. Weakness of the hands was seen in a worker who touched a lot of hydraulic fluids.

Rabbits that inhaled very high levels of one type of hydraulic fluid had trouble breathing, congested lungs, and became drowsy. The nervous systems of animals that swallowed or inhaled other hydraulic fluids were affected immediately with tremors, diarrhea, sweating, breathing difficulty, and sometimes several weeks later with weakness of the limbs, or paralysis. The immediate effects are caused because hydraulic fluids stop the action of certain enzymes, called cholinesterases, in the body. There are no reports of people swallowing or breathing the types of hydraulic fluids that cause these effects. When certain types of hydraulic fluids were put into the eyes of animals or allowed to touch the skin of people or animals for short periods of time, redness and swelling occurred. It is not known whether hydraulic fluids can cause birth defects or reproductive effects.

How likely are hydraulic fluids to cause cancer?

The Department of Health and Human Services (DHHS), the International Agency for Research on Cancer (IARC), and the EPA have not classified hydraulic fluids as to their carcinogenicity.

Is there a medical test to show whether I've been exposed to hydraulic fluids?

Hydraulic fluids can't be measured in blood, urine, or feces, but certain chemicals in the hydraulic fluids can be measured. Some of the hydraulic fluids stop the activity of certain enzymes, called cholinesterases, in blood and this activity can be measured. However, many other chemicals also cause this effect. This test isn't available at most doctors' offices, but can be done at special laboratories that have the right equipment.

Has the federal government made recommendations to protect human health?

There are no federal government recommendations to protect humans from the health effects of the major hydraulic fluids. However, mineral oil, the major chemical ingredient of one type of hydraulic fluid, is part of the petroleum distillate class of chemicals and there are regulations for these chemicals.

The Occupational Safety and Health Administration (OSHA) has set an exposure limit of 2,000 milligram per cubic meter (mg/m^3) petroleum distillates for an 8-hour workday, 40-hour workweek. The National Institute for Occupational Safety and Health (NIOSH) recommends an exposure limit of 350 mg/m^3 petroleum distillates for a 10-hour workday, 40-hour workweek.

Glossary

Additive: Substance added to another in small amounts to improve its properties.

CAS: Chemical Abstracts Service.

Carcinogenicity: Ability to cause cancer.

Petroleum Distillate: A chemical fraction of petroleum.

References

This ToxFAQs information is taken from the 1997 Toxicological Profile for Hydraulic Fluids produced by the Agency for Toxic Substances and Disease Registry, Public Health Service, U.S. Department of Health and Human Services, Public Health Service in Atlanta, GA.

Where can I get more information? For more information, contact the Agency for Toxic Substances and Disease Registry, Division of Toxicology, 1600 Clifton Road NE, Mailstop E-29, Atlanta, GA 30333. Phone: 1-888-422-8737, FAX: 404-498-0093. ToxFAQs Internet address via WWW is http://www.atsdr.cdc.gov/toxfaq.html ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns.

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NAPHTHALENE

CAS # 91-20-3

Agency for Toxic Substances and Disease Registry ToxFAQs September 1996

This fact sheet answers the most frequently asked health questions (FAQs) about naphthalene. For more information, call the ATSDR Information Center at 1-888-422-8737. This fact sheet is one in a series of summaries about hazardous substances and their health effects. This information is important because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

SUMMARY: Exposure to naphthalene happens mostly from breathing air contaminated from the burning of wood or fossil fuels, industrial discharges, tobacco smoke, or moth repellents. Exposure to large amounts of naphthalene may damage or destroy some of your red blood cells. Naphthalene has been found in at least 536 of the 1,430 National Priorities List sites identified by the Environmental Protection Agency (EPA).

What is naphthalene?

(Pronounced năf′thə-lēn′)

Naphthalene is a white solid that is found naturally in fossil fuels. Burning tobacco or wood produces naphthalene. It has a strong, but not unpleasant smell.

The major products made from naphthalene are moth repellents. It is also used for making dyes, resins, leather, tanning agents, and the insecticide, carbaryl.

What happens to naphthalene when it enters the environment?

- ☐ Naphthalene enters the environment from industrial uses, and from its use as a moth repellent.
- ☐ It also enters from the burning of wood or tobacco, and from accidental spills.
- ☐ Naphthalene evaporates easily.
- ☐ In air, moisture and sunlight break it down, often within 1 day.
- ☐ Naphthalene in water is destroyed by bacteria or evaporates into the air.
- ☐ Naphthalene binds weakly to soils and sediment.
- ☐ It does not accumulate in animals or fish.
- ☐ If dairy cows are exposed to naphthalene, some of it will be in their milk.
- ☐ If laying hens are exposed, some of it will be in their eggs.

How might I be exposed to naphthalene?

- ☐ Breathing low levels in outdoor air.
- ☐ Breathing air contaminated from industrial discharges or from burning wood or fossil fuels.
- ☐ Breathing air in homes or businesses where cigarettes are smoked, wood is burned, or moth repellents are used.
- ☐ Drinking water from contaminated wells.
- ☐ Touching clothing, blankets, or coverlets that are treated with naphthalene.

How can naphthalene affect my health?

Exposure to large amounts of naphthalene may damage or destroy some of your red blood cells. This could cause you to have too few red blood cells until your body replaces the destroyed cells. People, particularly children, have developed this problem after eating naphthalene-containing mothballs or deodorant blocks. Some of the symptoms of this problem are fatigue, lack of appetite, restlessness, and pale skin. Exposure to large amounts of naphthalene may also cause nausea, vomiting, diarrhea, blood in the urine, and a yellow color to the skin.

Animals sometimes develop cloudiness in their eyes after swallowing naphthalene. It is not clear if this also develops in people.

When mice were repeatedly exposed to naphthalene vapors for 2 years, their noses and lungs became inflamed and irritated.

How likely is naphthalene to cause cancer?

The Department of Health and Human Services (DHHS), the International Agency for Research on Cancer (IARC) and the EPA have not classified naphthalene as to its human carcinogenicity.

No studies are available in people. Naphthalene has caused cancer in studies in female mice, but not in male mice or in rats of either sex.

Is there a medical test to show whether I've been exposed to naphthalene?

Tests are available that measure levels of naphthalene and its breakdown products in urine, stool, blood, or maternal milk. A small sample of your body fat can also be removed and analyzed for naphthalene. These tests are not routinely available in a doctor's office. However, a sample taken in a doctor's office can be sent to a special laboratory, if needed.

These tests cannot determine exactly how much naphthalene you were exposed to or predict whether harmful effects will occur.

Has the federal government made recommendations to protect human health?

The EPA recommends that children not drink water containing over 0.5 parts of naphthalene per million parts of water (0.5 ppm) for more than 10 days, or 0.4 ppm for longer than 7 years. Adults should not drink water with more than 1 ppm for more than 7 years. For water consumed over a lifetime, the EPA suggests it contain no more than 0.02 ppm naphthalene. The EPA requires that discharges or spills into the environment of 100 pounds or more be reported.

The Occupational Safety and Health Administration (OSHA) has set a limit of 10 parts per million (10 ppm) for the level of naphthalene in workplace air over an 8-hour workday, 40-hour workweek.

The National Institute for Occupational Safety and Health (NIOSH) considers more than 250 ppm of naphthalene in air to be immediately dangerous to life or health. This is the exposure level of a chemical that is likely to cause permanent health problems or death.

Glossary

Carcinogenicity: Ability of a substance to cause cancer.

CAS: Chemical Abstracts Service.

Insecticide: A substance that kills insects.

Sediment: Mud and debris that have settled to the bottom of a body of water.

References

Agency for Toxic Substances and Disease Registry (ATSDR). 1995. Toxicological profile for naphthalene, 1-methylnaphthalene, and 2-methylnaphthalene (update). Atlanta, GA: U.S. Department of Health and Human Services, Public Health Services.

Where can I get more information? For more information, contact the Agency for Toxic Substances and Disease Registry, Division of Toxicology, 1600 Clifton Road NE, Mailstop E-29, Atlanta, GA 30333. Phone: 1-888-422-8737, FAX: 404-498-0093. ToxFAQs Internet address via WWW is http://www.atsdr.cdc.gov/toxfaq.html ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns.

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LEAD
CAS # 7439-92-1

Agency for Toxic Substances and Disease Registry ToxFAQs June 1999

This fact sheet answers the most frequently asked health questions (FAQs) about lead. For more information, call the ATSDR Information Center at 1-888-422-8737. This fact sheet is one in a series of summaries about hazardous substances and their health effects. It's important you understand this information because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

HIGHLIGHTS: Exposure to lead can happen from breathing workplace air or dust, eating contaminated foods, or drinking contaminated water. Children can be exposed from eating lead-based paint chips or playing in contaminated soil. Lead can damage the nervous system, kidneys, and reproductive system. Lead has been found in at least 1,026 of 1,467 National Priorities List sites identified by the Environmental Protection Agency (EPA).

What is lead?
(Pronounced lĕd)

Lead is a naturally occurring bluish-gray metal found in small amounts in the earth's crust. Lead can be found in all parts of our environment. Much of it comes from human activities including burning fossil fuels, mining, and manufacturing.

Lead has many different uses. It is used in the production of batteries, ammunition, metal products (solder and pipes), and devices to shield X-rays.

Because of health concerns, lead from gasoline, paints and ceramic products, caulking, and pipe solder has been dramatically reduced in recent years.

What happens to lead when it enters the environment?

☐ Lead itself does not break down, but lead compounds are changed by sunlight, air, and water.

☐ When lead is released to the air, it may travel long distances before settling to the ground.

☐ Once lead falls onto soil, it usually sticks to soil particles.

☐ Movement of lead from soil into groundwater will depend on the type of lead compound and the characteristics of the soil.

☐ Much of the lead in inner-city soils comes from old houses painted with lead-based paint.

How might I be exposed to lead?

☐ Eating food or drinking water that contains lead.

☐ Spending time in areas where lead-based paints have been used and are deteriorating.

☐ Working in a job where lead is used.

☐ Using health-care products or folk remedies that contain lead.

☐ Engaging in certain hobbies in which lead is used (for example, stained glass).

How can lead affect my health?

Lead can affect almost every organ and system in your body. The most sensitive is the central nervous system, particularly in children. Lead also damages kidneys and the reproductive system. The effects are the same whether it is breathed or swallowed.

At high levels, lead may decrease reaction time, cause weakness in fingers, wrists, or ankles, and possibly affect the memory. Lead may cause anemia, a disorder of the blood. It can also damage the male reproductive system. The connection between these effects and exposure to low levels of lead is uncertain.

How likely is lead to cause cancer?

The Department of Health and Human Services has determined that lead acetate and lead phosphate may reasonably be anticipated to be carcinogens based on studies in animals. There is inadequate evidence to clearly determine lead's carcinogenicity in people.

How can lead affect children?

Small children can be exposed by eating lead-based paint chips, chewing on objects painted with lead-based paint, or swallowing house dust or soil that contains lead.

Children are more vulnerable to lead poisoning than adults. A child who swallows large amounts of lead may develop blood anemia, severe stomachache, muscle weakness, and brain damage. A large amount of lead might get into a child's body if the child ate small pieces of old paint that contained large amounts of lead. If a child swallows smaller amounts of lead, much less severe effects on blood and brain function may occur. Even at much lower levels of exposure, lead can affect a child's mental and physical growth.

Exposure to lead is more dangerous for young and unborn children. Unborn children can be exposed to lead through their mothers. Harmful effects include premature births, smaller babies, decreased mental ability in the infant, learning difficulties, and reduced growth in young children. These effects are more common if the mother or baby was exposed to high levels of lead.

How can families reduce the risk of exposure to lead?

Avoid exposure to sources of lead. Do not allow children to chew or mouth painted surfaces that may have been painted with lead-based paint (homes built before 1978). Run your water for 15 to 30 seconds before drinking or cooking with it. This will get rid of lead that may have leached out of pipes. Some types of paints and pigments that are used as make-up or hair coloring contain lead. Keep these kinds of products away from children. Wash children's hands and faces often to remove lead dusts and soil, and regularly clean the house of dust and tracked in soil.

Is there a medical test to show whether I've been exposed to lead?

A blood test is available to measure the amount of lead in your blood and to estimate the amount of your exposure to lead. Blood tests are commonly used to screen children for lead poisoning. Lead in teeth and bones can be measured with X-rays, but this test is not as readily available. Medical treatment may be necessary in children if the lead concentration in blood is higher than 45 micrograms per deciliter (45 µg/dL).

Has the federal government made recommendations to protect human health?

The Centers for Disease Control and Prevention (CDC) recommends that children ages 1 and 2 be screened for lead poisoning. Children who are 3 to 6 years old should be tested for lead if they have never been tested for lead before and if they receive services from public assistance programs; if they live in or regularly visit a building built before 1950; if they live in or visit a home built before 1978 that is being remodeled; or if they have a brother, sister, or playmate who has had lead poisoning. CDC considers children to have an elevated level of lead if the amount in the blood is 10 µg/dL.

The EPA requires lead in air not to exceed 1.5 micrograms per cubic meter (1.5 $\mu g/m^3$) averaged over 3 months. EPA limits lead in drinking water to 15 µg per liter.

The Occupational Health and Safety Administration (OSHA) develops regulations for workers exposed to lead. The Clean Air Act Amendments of 1990 banned the sale of leaded gasoline. The Federal Hazardous Substance Act bans children's products that contain hazardous amounts of lead.

References

Agency for Toxic Substances and Disease Registry (ATSDR). 1999. Toxicological profile for lead. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service.

Where can I get more information? For more information, contact the Agency for Toxic Substances and Disease Registry, Division of Toxicology, 1600 Clifton Road NE, Mailstop E-29, Atlanta, GA 30333. Phone: 1-888-422-8737, FAX: 404-498-0093. ToxFAQs Internet address via WWW is http://www.atsdr.cdc.gov/toxfaq.html ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns.

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METHYL *TERT*-BUTYL ETHER (MTBE) CAS # 1634-04-4

Agency for Toxic Substances and Disease Registry ToxFAQs September 1997

This fact sheet answers the most frequently asked health questions (FAQs) about methyl *tert*-butyl ether (MTBE). For more information, call the ATSDR Information Center at 1-888-422-8737. This fact sheet is one in a series of summaries about hazardous substances and their health effects. This information is important because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

HIGHLIGHTS: Methyl *tert*-butyl ether (MTBE) is a flammable liquid which is used as an additive in unleaded gasoline. Drinking or breathing MTBE may cause nausea, nose and throat irritation, and nervous system effects. MTBE has been found in at least 11 of the 1,430 National Priorities List sites identified by the Environmental Protection Agency (EPA).

What is methyl *tert*-butyl ether?

(Pronounced mĕth′əl tũ̄r′shē-ĕr′ē byo͞ot′l ē′thər)

Methyl *tert*-butyl ether (MTBE) is a flammable liquid with a distinctive, disagreeable odor. It is made from blending chemicals such as isobutylene and methanol, and has been used since the 1980s as an additive for unleaded gasolines to achieve more efficient burning.

MTBE is also used to dissolve gallstones. Patients treated in this way have MTBE delivered directly to their gall bladders through special tubes that are surgically inserted.

What happens to MTBE when it enters the environment?

- ☐ MTBE quickly evaporates from open containers and surface water, so it is commonly found as a vapor in the air.
- ☐ Small amounts of MTBE may dissolve in water and get into underground water.
- ☐ It remains in underground water for a long time.
- ☐ MTBE may stick to particles in water, which will cause it to eventually settle to the bottom sediment.
- ☐ MTBE may be broken down quickly in the air by sunlight.
- ☐ MTBE does not build up significantly in plants and animals.

How might I be exposed to MTBE?

- ☐ Touching the skin or breathing contaminated air while pumping gasoline.
- ☐ Breathing exhaust fumes while driving a car.
- ☐ Breathing air near highways or in cities.
- ☐ Drinking, swimming, or showering in water that has been contaminated with MTBE.
- ☐ Receiving MTBE treatment for gallstones.

How can MTBE affect my health?

Breathing small amounts of MTBE for short periods may cause nose and throat irritation. Some people exposed to MTBE while pumping gasoline, driving their cars, or working in gas stations have reported having headaches, nausea, dizziness, and mental confusion. However, the actual levels of exposure in these cases are unknown. In addition, these symptoms may have been caused by exposure to other chemicals.

There are no data on the effects in people of drinking MTBE. Studies with rats and mice suggest that drinking MTBE may cause gastrointestinal irritation, liver and kidney damage, and nervous system effects.

How likely is MTBE to cause cancer?

There is no evidence that MTBE causes cancer in humans. One study with rats found that breathing high levels of MTBE for long periods may cause kidney cancer. Another study with mice found that breathing high levels of MTBE for long periods may cause liver cancer.

The Department of Health and Human Services (DHHS), the International Agency for Research on Cancer (IARC), and the EPA have not classified MTBE as to its carcinogenicity.

Is there a medical test to show whether I've been exposed to MTBE?

MTBE and its breakdown product, butyl alcohol, can be detected in your breath, blood, or urine for up to 1 or 2 days after exposure. These tests aren't available at most doctors' offices, but can be done at special laboratories that have the right equipment. There is no other test specific to determining MTBE exposure.

Has the federal government made recommendations to protect human health?

The EPA has issued guidelines recommending that, to protect children, drinking water levels of MTBE not exceed 4 milligrams per liter of water (4 mg/L) for an exposure of 1-10 days, and 3 mg/L for longer-term exposures.

The American Conference of Governmental Industrial Hygienists (ACGIH) has recommended an exposure limit of 40 parts of MTBE per million parts of air (40 ppm) for an 8-hour workday, 40-hour workweek.

Glossary

Carcinogenicity: Ability to cause cancer.

CAS: Chemical Abstracts Service.

Evaporate: To change into a vapor or gas.

Milligram (mg): One thousandth of a gram.

ppm: Parts per million.

Sediment: Mud and debris that have settled to the bottom of a body of water.

References

This ToxFAQs information is taken from the 1996 Toxicological Profile for Methyl *tert*-Butyl Ether produced by the Agency for Toxic Substances and Disease Registry, Public Health Service, U.S. Department of Health and Human Services, Public Health Service in Atlanta, GA.

Where can I get more information? For more information, contact the Agency for Toxic Substances and Disease Registry, Division of Toxicology, 1600 Clifton Road NE, Mailstop E-29, Atlanta, GA 30333. Phone: 1-888-422-8737, FAX: 404-498-0093. ToxFAQs Internet address via WWW is http://www.atsdr.cdc.gov/toxfaq.html ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns.

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POLYCHLORINATED BIPHENYLS

Division of Toxicology ToxFAQs™ **February 2001**

This fact sheet answers the most frequently asked health questions (FAQs) about polychlorinated biphenyls. For more information, call the ATSDR Information Center at 1-888-422-8737. This fact sheet is one in a series of summaries about hazardous substances and their health effects. It's important you understand this information because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

HIGHLIGHTS: Polychlorinated biphenyls (PCBs) are a mixture of individual chemicals which are no longer produced in the United States, but are still found in the environment. Health effects that have been associated with exposure to PCBs include acne-like skin conditions in adults and neurobehavioral and immunological changes in children. PCBs are known to cause cancer in animals. PCBs have been found in at least 500 of the 1,598 National Priorities List sites identified by the Environmental Protection Agency (EPA).

What are polychlorinated biphenyls?

Polychlorinated biphenyls are mixtures of up to 209 individual chlorinated compounds (known as congeners). There are no known natural sources of PCBs. PCBs are either oily liquids or solids that are colorless to light yellow. Some PCBs can exist as a vapor in air. PCBs have no known smell or taste. Many commercial PCB mixtures are known in the U.S. by the trade name Aroclor.

PCBs have been used as coolants and lubricants in transformers, capacitors, and other electrical equipment because they don't burn easily and are good insulators. The manufacture of PCBs was stopped in the U.S. in 1977 because of evidence they build up in the environment and can cause harmful health effects. Products made before 1977 that may contain PCBs include old fluorescent lighting fixtures and electrical devices containing PCB capacitors, and old microscope and hydraulic oils.

What happens to PCBs when they enter the environment?

❑ PCBs entered the air, water, and soil during their manufacture, use, and disposal; from accidental spills and leaks during their transport; and from leaks or fires in products containing PCBs.

❑ PCBs can still be released to the environment from hazardous waste sites; illegal or improper disposal of industrial wastes and consumer products; leaks from old electrical transformers containing PCBs; and burning of some wastes in incinerators.

❑ PCBs do not readily break down in the environment and thus may remain there for very long periods of time. PCBs can travel long distances in the air and be deposited in areas far away from where they were released. In water, a small amount of PCBs may remain dissolved, but most stick to organic particles and bottom sediments. PCBs also bind strongly to soil.

❑ PCBs are taken up by small organisms and fish in water. They are also taken up by other animals that eat these aquatic animals as food. PCBs accumulate in fish and marine mammals, reaching levels that may be many thousands of times higher than in water.

How might I be exposed to PCBs?

❑ Using old fluorescent lighting fixtures and electrical devices and appliances, such as television sets and refrigerators, that were made 30 or more years ago. These items may leak small amounts of PCBs into the air when they get hot during operation, and could be a source of skin exposure.

❑ Eating contaminated food. The main dietary sources of PCBs are fish (especially sportfish caught in contaminated lakes or rivers), meat, and dairy products.

❑ Breathing air near hazardous waste sites and drinking contaminated well water.

❑ In the workplace during repair and maintenance of PCB transformers; accidents, fires or spills involving transformers, fluorescent lights, and other old electrical devices; and disposal of PCB materials.

How can PCBs affect my health?

The most commonly observed health effects in people exposed to large amounts of PCBs are skin conditions such as acne and rashes. Studies in exposed workers have shown changes in blood and urine that may indicate liver damage. PCB exposures in the general population are not likely to result in skin and liver effects. Most of the studies of health effects of PCBs in the general population examined children of mothers who were exposed to PCBs.

Animals that ate food containing large amounts of PCBs for short periods of time had mild liver damage and some died. Animals that ate smaller amounts of PCBs in food over several weeks or months developed various kinds of health effects, including anemia; acne-like skin conditions; and liver, stomach, and thyroid gland injuries. Other effects of PCBs in animals include changes in the immune system, behavioral alterations, and impaired reproduction. PCBs are not known to cause birth defects.

How likely are PCBs to cause cancer?

Few studies of workers indicate that PCBs were associated with certain kinds of cancer in humans, such as cancer of the liver and biliary tract. Rats that ate food containing high levels of PCBs for two years developed liver cancer. The Department of Health and Human Services (DHHS) has concluded that PCBs may reasonably be anticipated to be carcinogens. The EPA and the International Agency for Research on Cancer (IARC) have determined that PCBs are probably carcinogenic to humans.

How can PCBs affect children?

Women who were exposed to relatively high levels of PCBs in the workplace or ate large amounts of fish contaminated with PCBs had babies that weighed slightly less than babies from women who did not have these exposures. Babies born to women who ate PCB-contaminated fish also showed abnormal responses in tests of infant behavior. Some of these behaviors, such as problems with motor skills and a decrease in short-term memory, lasted for several years. Other studies suggest that the immune system was affected in children born to and nursed by mothers exposed to increased levels of PCBs. There are no reports of structural birth defects caused by exposure to PCBs or of health effects of PCBs in older children. The most likely way infants will be exposed to PCBs is from breast milk. Transplacental transfers of PCBs were also reported In most cases, the benefits of breast-feeding outweigh any risks from exposure to PCBs in mother's milk.

How can families reduce the risk of exposure to PCBs?

☐ You and your children may be exposed to PCBs by eating fish or wildlife caught from contaminated locations. Certain states, Native American tribes, and U.S. territories have issued advisories to warn people about PCB-contaminated fish and fish-eating wildlife. You can reduce your family's exposure to PCBs by obeying these advisories.

☐ Children should be told not play with old appliances, electrical equipment, or transformers, since they may contain PCBs.

☐ Children should be discouraged from playing in the dirt near hazardous waste sites and in areas where there was a transformer fire. Children should also be discouraged from eating dirt and putting dirty hands, toys or other objects in their mouths, and should wash hands frequently.

☐ If you are exposed to PCBs in the workplace it is possible to carry them home on your clothes, body, or tools. If this is the case, you should shower and change clothing before leaving work, and your work clothes should be kept separate from other clothes and laundered separately.

Is there a medical test to show whether I've been exposed to PCBs?

Tests exist to measure levels of PCBs in your blood, body fat, and breast milk, but these are not routinely conducted. Most people normally have low levels of PCBs in their body because nearly everyone has been environmentally exposed to PCBs. The tests can show if your PCB levels are elevated, which would indicate past exposure to above-normal levels of PCBs, but cannot determine when or how long you were exposed or whether you will develop health effects.

Has the federal government made recommendations to protect human health?

The EPA has set a limit of 0.0005 milligrams of PCBs per liter of drinking water (0.0005 mg/L). Discharges, spills or accidental releases of 1 pound or more of PCBs into the environment must be reported to the EPA. The Food and Drug Administration (FDA) requires that infant foods, eggs, milk and other dairy products, fish and shellfish, poultry and red meat contain no more than 0.2-3 parts of PCBs per million parts (0.2-3 ppm) of food. Many states have established fish and wildlife consumption advisories for PCBs.

References

Agency for Toxic Substances and Disease Registry (ATSDR). 2000. Toxicological profile for polychlorinated biphenyls (PCBs). Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service.

Where can I get more information? For more information, contact the Agency for Toxic Substances and Disease Registry, Division of Toxicology, 1600 Clifton Road NE, Mailstop E-29, Atlanta, GA 30333. Phone: 1-888-422-8737, FAX: 404-498-0093. ToxFAQs™ Internet address is http://www.atsdr.cdc.gov/toxfaq.html. ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns.

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POLYCYCLIC AROMATIC HYDROCARBONS (PAHs)

Agency for Toxic Substances and Disease Registry ToxFAQs September 1996

This fact sheet answers the most frequently asked health questions (FAQs) about polycyclic aromatic hydrocarbons (PAHs). For more information, call the ATSDR Information Center at 1-888-422-8737. This fact sheet is one in a series of summaries about hazardous substances and their health effects. This information is important because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

SUMMARY: Exposure to polycyclic aromatic hydrocarbons usually occurs by breathing air contaminated by wild fires or coal tar, or by eating foods that have been grilled. PAHs have been found in at least 600 of the 1,430 National Priorities List sites identified by the Environmental Protection Agency (EPA).

What are polycyclic aromatic hydrocarbons?

(Pronounced pŏl′ĭ-sī′klĭk ăr′ə-măt′ĭk hī′drə-kar′bənz)

Polycyclic aromatic hydrocarbons (PAHs) are a group of over 100 different chemicals that are formed during the incomplete burning of coal, oil and gas, garbage, or other organic substances like tobacco or charbroiled meat. PAHs are usually found as a mixture containing two or more of these compounds, such as soot.

Some PAHs are manufactured. These pure PAHs usually exist as colorless, white, or pale yellow-green solids. PAHs are found in coal tar, crude oil, creosote, and roofing tar, but a few are used in medicines or to make dyes, plastics, and pesticides.

What happens to PAHs when they enter the environment?

- ☐ PAHs enter the air mostly as releases from volcanoes, forest fires, burning coal, and automobile exhaust.
- ☐ PAHs can occur in air attached to dust particles.
- ☐ Some PAH particles can readily evaporate into the air from soil or surface waters.
- ☐ PAHs can break down by reacting with sunlight and other chemicals in the air, over a period of days to weeks.
- ☐ PAHs enter water through discharges from industrial and wastewater treatment plants.
- ☐ Most PAHs do not dissolve easily in water. They stick to solid particles and settle to the bottoms of lakes or rivers.
- ☐ Microorganisms can break down PAHs in soil or water after a period of weeks to months.
- ☐ In soils, PAHs are most likely to stick tightly to particles; certain PAHs move through soil to contaminate underground water.
- ☐ PAH contents of plants and animals may be much higher than PAH contents of soil or water in which they live.

How might I be exposed to PAHs?

- ☐ Breathing air containing PAHs in the workplace of coking, coal-tar, and asphalt production plants; smokehouses; and municipal trash incineration facilities.
- ☐ Breathing air containing PAHs from cigarette smoke, wood smoke, vehicle exhausts, asphalt roads, or agricultural burn smoke.
- ☐ Coming in contact with air, water, or soil near hazardous waste sites.
- ☐ Eating grilled or charred meats; contaminated cereals, flour, bread, vegetables, fruits, meats; and processed or pickled foods.
- ☐ Drinking contaminated water or cow's milk.

☐ Nursing infants of mothers living near hazardous waste sites may be exposed to PAHs through their mother's milk.

How can PAHs affect my health?

Mice that were fed high levels of one PAH during pregnancy had difficulty reproducing and so did their offspring. These offspring also had higher rates of birth defects and lower body weights. It is not known whether these effects occur in people.

Animal studies have also shown that PAHs can cause harmful effects on the skin, body fluids, and ability to fight disease after both short- and long-term exposure. But these effects have not been seen in people.

How likely are PAHs to cause cancer?

The Department of Health and Human Services (DHHS) has determined that some PAHs may reasonably be expected to be carcinogens.

Some people who have breathed or touched mixtures of PAHs and other chemicals for long periods of time have developed cancer. Some PAHs have caused cancer in laboratory animals when they breathed air containing them (lung cancer), ingested them in food (stomach cancer), or had them applied to their skin (skin cancer).

Is there a medical test to show whether I've been exposed to PAHs?

In the body, PAHs are changed into chemicals that can attach to substances within the body. There are special tests that can detect PAHs attached to these substances in body tissues or blood. However, these tests cannot tell whether any health effects will occur or find out the extent or source of your exposure to the PAHs. The tests aren't usually available in your doctor's office because special equipment is needed to conduct them.

Has the federal government made recommendations to protect human health?

The Occupational Safety and Health Administration (OSHA) has set a limit of 0.2 milligrams of PAHs per cubic meter of air (0.2 mg/m^3). The OSHA Permissible Exposure Limit (PEL) for mineral oil mist that contains PAHs is 5 mg/m^3 averaged over an 8-hour exposure period.

The National Institute for Occupational Safety and Health (NIOSH) recommends that the average workplace air levels for coal tar products not exceed 0.1 mg/m^3 for a 10-hour workday, within a 40-hour workweek. There are other limits for workplace exposure for things that contain PAHs, such as coal, coal tar, and mineral oil.

Glossary

Carcinogen: A substance that can cause cancer.

Ingest: Take food or drink into your body.

References

Agency for Toxic Substances and Disease Registry (ATSDR). 1995. Toxicological profile for polycyclic aromatic hydrocarbons. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service.

Where can I get more information? For more information, contact the Agency for Toxic Substances and Disease Registry, Division of Toxicology, 1600 Clifton Road NE, Mailstop E-29, Atlanta, GA 30333. Phone: 1-888-422-8737, FAX: 404-498-0093. ToxFAQs Internet address via WWW is http://www.atsdr.cdc.gov/toxfaq.html ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns.

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TOLUENE

CAS # 108-88-3

Division of Toxicology ToxFAQs™ February 2001

This fact sheet answers the most frequently asked health questions (FAQs) about toluene. For more information, call the ATSDR Information Center at 1-888-422-8737. This fact sheet is one in a series of summaries about hazardous substances and their health effects. It's important you understand this information because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

HIGHLIGHTS: Exposure to toluene occurs from breathing contaminated workplace air, in automobile exhaust, some consumer products paints, paint thinners, fingernail polish, lacquers, and adhesives. Toluene affects the nervous system. Toluene has been found at 959 of the 1,591 National Priority List sites identified by the Environmental Protection Agency

What is toluene?

Toluene is a clear, colorless liquid with a distinctive smell. Toluene occurs naturally in crude oil and in the tolu tree. It is also produced in the process of making gasoline and other fuels from crude oil and making coke from coal.

Toluene is used in making paints, paint thinners, fingernail polish, lacquers, adhesives, and rubber and in some printing and leather tanning processes.

What happens to toluene when it enters the environment?

☐ Toluene enters the environment when you use materials that contain it. It can also enter surface water and groundwater from spills of solvents and petrolieum products as well as from leasking underground storage tanks at gasoline stations and other facilities.

☐ When toluene-containing products are placed in landfills or waste disposal sites, the toluene can enter the soil or water near the waste site.

☐ Toluene does not usually stay in the environment long.

☐ Toluene does not concentrate or buildup to high levels in animals.

How might I be exposed to toluene?

☐ Breathing contaminated workplace air or automobile exhaust.

☐ Working with gasoline, kerosene, heating oil, paints, and lacquers.

☐ Drinking contaminated well-water.

☐ Living near uncontrolled hazardous waste sites containing toluene products.

How can toluene affect my health?

Toluene may affect the nervous system. Low to moderate levles can cause tiredness, confusion, weakness, drunken-type actions, memory loss, nausea, loss of appetite, and hearing and color vision loss. These symptoms usually disappear when exposure is stopped.

Inhaling High levels of toluene in a short time can make you feel light-headed, dizzy, or sleepy. It can also cause unconsciousness, and even death.

High levels of toluene may affect your kidneys.

How likely is toluene to cause cancer?

Studies in humans and animals generally indicate that toluene does not cause cancer.

The EPA has determined that the carcinogenicity of toluene can not be classified.

How can toluene affect children?

It is likely that health effects seen in children exposed to toluene will be similar to the effects seen in adults.
Some studies in animals suggest that babies may be more sensitive than adults.

Breathing very high levels of toluene during pregnancy can result in children with birth defects and retard mental abilities, and growth. We do not know if toluene harms the unborn child if the mother is exposed to low levels of toluene during pregnancy.

How can families reduce the risk of exposure to toluene?

☐ Use toluene-containing products in well-ventilated areas.

☐ When not in use, toluene-containing products should be tightly covered to prevent evaporation into the air.

Is there a medical test to show whether I've been exposed to toluene?

There are tests to measure the level of toluene or its breakdown products in exhaled air, urine, and blood. To determine if you have been exposed to toluene, your urine or blood must be checked within 12 hours of exposure. Several other chemicals are also changed into the same breakdown products as toluene, so some of these tests are not specific for toluene.

Has the federal government made recommendations to protect human health?

EPA has set a limit of 1 milligram per liter of drinking water (1 mg/L).

Discharges, releases, or spills of more than 1,000 pounds of toluene must be reported to the National Response Center.

The Occupational Safety and Health Administration has set a limit of 200 parts toluene per million of workplace air (200 ppm).

Source of Information

Agency for Toxic Substances and Disease Registry (ATSDR). 2000. Toxicological Profile for Toluene. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service.

Where can I get more information? For more information, contact the Agency for Toxic Substances and Disease Registry, Division of Toxicology, 1600 Clifton Road NE, Mailstop E-29, Atlanta, GA 30333. Phone: 1-888-422-8737, FAX: 404-498-0093. ToxFAQs™ Internet address is http://www.atsdr.cdc.gov/toxfaq.html. ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns.

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USED MINERAL-BASED CRANKCASE OIL
CAS # 8002-05-9

Agency for Toxic Substances and Disease Registry ToxFAQs September 1997

This fact sheet answers the most frequently asked health questions (FAQs) about used mineral-based crankcase oil. For more information, call the ATSDR Information Center at 1-888-422-8737. This fact sheet is one in a series of summaries about hazardous substances and their health effects. It's important you understand this information because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

HIGHLIGHTS: Used mineral-based crankcase oil is also called used engine oil. Exposure to this oil can occur when you change the oil of your car or another type of engine. Exposure to very high levels of used oil can cause skin rashes, headaches and tremors. Used oil has been found in at least 85 of the 1,416 National Priorities List sites identified by the Environmental Protection Agency (EPA).

What is used mineral-based crankcase oil?

Used mineral-based crankcase oil is the brown-to-black, oily liquid removed from the engine of a motor vehicle when the oil is changed. It is similar to unused oil except it contains additional chemicals from its use as an engine lubricant.

The chemicals in oil include hydrocarbons, which are distilled from crude oil, and various additives that improve the oil's performance. Used oil also contains chemicals formed when the oil is exposed to high temperatures and pressures inside an engine. It also contains some metals from engine parts and small amounts of gasoline, antifreeze, and chemicals that come from gasoline when it burns inside the engine.

The chemicals found in used mineral-based crankcase oil vary depending on the brand and type of oil, whether gasoline or diesel fuel was used, the mechanical condition of the engine that the oil came from, and the amount of use between oil changes. Used oil is not naturally found in the environment.

What happens to used mineral-based crankcase oil when it enters the environment?

- ☐ Used mineral-based crankcase oil enters the air through the exhaust system during engine use.
- ☐ It may enter water or soil when disposed of improperly.
- ☐ The hydrocarbon components of the oil generally stick to the soil surface.
- ☐ Some hydrocarbons evaporate into the air very quickly, and others evaporate more slowly.
- ☐ Hydrocarbon components of the oil that enter surface water bind to small particles in the water and eventually settle to the bottom.
- ☐ Hydrocarbons from used mineral-based crankcase oil may build up in shellfish or other organisms.
- ☐ Some metals in used mineral-based crankcase oil dissolve in water and move through the soil easily and may be found in surface water and groundwater.

How might I be exposed to used mineral-based crankcase oil?

- ☐ When you change the engine oil in your car.
- ☐ Breathing a small amount of the chemicals from the oil in exhaust fumes or from burning the oil as heating fuel.
- ☐ Touching contaminated soil or drinking contaminated water.

How can used mineral-based crankcase oil affect my health?

The health effects of used mineral-based crankcase oil vary depending on the brand and type of oil used and the characteristics of the engine it came from.

Mechanics and other auto workers who are exposed to used mineral-based crankcase oil from a large number of cars have experienced skin rashes, blood effects (anemia), and headaches and tremors. However, these workers are also exposed to other chemicals, which may have caused these health effects.

Volunteers who breathed mists of used mineral-based crankcase oil for a few minutes had slightly irritated noses, throats, and eyes. Animals that ate large amounts of this oil developed diarrhea. Thus, people who swallow used mineral-based crankcase oil may also have diarrhea.

Some cows that ate used oil containing metals such as molybdenum and lead in contaminated pastures experienced anemia and tremors. Some of the cows died.

We do not know if exposure to used mineral-based crankcase oil affects the reproductive ability of men or women or whether it causes birth defects.

How likely is used mineral-based crankcase oil to cause cancer?

Long-term exposure (365 days or longer) of the skin to used mineral-based crankcase oil causes skin cancer in mice. Oils contain PAHs. Some PAHs have been identified as the cancer-causing agents. Animal tests have shown that the higher the PAH content in oil, the more likely for the oil to be carcinogenic.

The **Department of Health and Human Services (DHHS)**, the **International Agency for Research on Cancer (IARC)**, and the **EPA** have not classified used mineral-based crankcase oil with regard to its carcinogenicity in people.

Is there a medical test to show whether I've been exposed to used mineral-based crankcase oil?

Used mineral-based crankcase oil is a mixture of a large number of chemicals. Its composition depends on the brand of oil and the characteristics of the engine in which it was used. However, there are methods for determining if you have been exposed to some of the chemicals in used oil. These tests aren't available at most doctors' offices, but can be done at special laboratories that have the right equipment.

Has the federal government made recommendations to protect human health?

The EPA and most states have developed regulations regarding disposal of used oil, its recycling, spraying used oil onto road surfaces for dust control, or burning it as a fuel.

Glossary

Anemia: A decreased ability of the blood to transport oxygen.

Carcinogenicity: Ability to cause cancer.

CAS: Chemical Abstracts Service.

Evaporate: To enter the air as a vapor.

PAHs: Polyaromatic hydrocarbons; a group of chemicals found in oil and other minerals.

References

This ToxFAQs information is taken from the 1997 Toxicological Profile for Used Mineral-based Crankcase Oil produced by the Agency for Toxic Substances and Disease Registry, Public Health Service, U.S. Department of Health and Human Services, Public Health Service in Atlanta, GA.

Where can I get more information? For more information, contact the Agency for Toxic Substances and Disease Registry, Division of Toxicology, 1600 Clifton Road NE, Mailstop E-29, Atlanta, GA 30333. Phone:1-888-422-8737, FAX: 404-498-0093. ToxFAQs Internet address via WWW is http://www.atsdr.cdc.gov/toxfaq.html ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns.

ATSDR
AGENCY FOR TOXIC SUBSTANCES
AND DISEASE REGISTRY

XYLENE

CAS # 1330-20-7

Agency for Toxic Substances and Disease Registry ToxFAQs September 1996

This fact sheet answers the most frequently asked health questions (FAQs) about xylene. For more information, call the ATSDR Information Center at 1-888-422-8737. This fact sheet is one in a series of summaries about hazardous substances and their health effects. It's important you understand this information because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

SUMMARY: Exposure to xylene occurs in the workplace and when you use paint, gasoline, paint thinners and other products that contain it. People who breathe high levels may have dizziness, confusion, and a change in their sense of balance. This substance has been found in at least 658 of the 1,430 National Priorities List sites identified by the Environmental Protection Agency (EPA).

What is xylene?

(Pronounced zī′lēn)

Xylene is a colorless, sweet-smelling liquid that catches on fire easily. It occurs naturally in petroleum and coal tar and is formed during forest fires. You can smell xylene in air at 0.08–3.7 parts of xylene per million parts of air (ppm) and begin to taste it in water at 0.53–1.8 ppm.

Chemical industries produce xylene from petroleum. It's one of the top 30 chemicals produced in the United States in terms of volume.

Xylene is used as a solvent and in the printing, rubber, and leather industries. It is also used as a cleaning agent, a thinner for paint, and in paints and varnishes. It is found in small amounts in airplane fuel and gasoline.

What happens to xylene when it enters the environment?

- ☐ Xylene has been found in waste sites and landfills when discarded as used solvent, or in varnish, paint, or paint thinners.
- ☐ It evaporates quickly from the soil and surface water into the air.
- ☐ In the air, it is broken down by sunlight into other less harmful chemicals.
- ☐ It is broken down by microorganisms in soil and water.
- ☐ Only a small amount of it builds up in fish, shellfish, plants, and animals living in xylene-contaminated water.

How might I be exposed to xylene?

- ☐ Breathing xylene in workplace air or in automobile exhaust.
- ☐ Breathing contaminated air.
- ☐ Touching gasoline, paint, paint removers, varnish, shellac, and rust preventatives that contain it.
- ☐ Breathing cigarette smoke that has small amounts of xylene in it.
- ☐ Drinking contaminated water or breathing air near waste sites and landfills that contain xylene.
- ☐ The amount of xylene in food is likely to be low.

How can xylene affect my health?

Xylene affects the brain. High levels from exposure for short periods (14 days or less) or long periods (more than 1 year) can cause headaches, lack of muscle coordination, dizziness, confusion, and changes in one's sense of balance. Exposure of people to high levels of xylene for short periods can also cause irritation of the skin, eyes, nose, and throat; difficulty in breathing; problems with the lungs; delayed reaction time; memory difficulties; stomach discomfort; and possibly changes in the liver and kidneys. It can cause unconsciousness and even death at very high levels.

Studies of unborn animals indicate that high concentrations of xylene may cause increased numbers of deaths, and delayed growth and development. In many instances, these same concentrations also cause damage to the mothers. We do not know if xylene harms the unborn child if the mother is exposed to low levels of xylene during pregnancy.

How likely is xylene to cause cancer?

The International Agency for Research on Cancer (IARC) has determined that xylene is not classifiable as to its carcinogenicity in humans.

Human and animal studies have not shown xylene to be carcinogenic, but these studies are not conclusive and do not provide enough information to conclude that xylene does not cause cancer.

Is there a medical test to show whether I've been exposed to xylene?

Laboratory tests can detect xylene or its breakdown products in exhaled air, blood, or urine. There is a high degree of agreement between the levels of exposure to xylene and the levels of xylene breakdown products in the urine. However, a urine sample must be provided very soon after exposure ends because xylene quickly leaves the body. These tests are not routinely available at your doctor's office.

Has the federal government made recommendations to protect human health?

The EPA has set a limit of 10 ppm of xylene in drinking water.

The EPA requires that spills or accidental releases of xylenes into the environment of 1,000 pounds or more must be reported.

The Occupational Safety and Health Administration (OSHA) has set a maximum level of 100 ppm xylene in workplace air for an 8-hour workday, 40-hour workweek.

The National Institute for Occupational Safety and Health (NIOSH) and the American Conference of Governmental Industrial Hygienists (ACGIH) also recommend exposure limits of 100 ppm in workplace air.

NIOSH has recommended that 900 ppm of xylene be considered immediately dangerous to life or health. This is the exposure level of a chemical that is likely to cause permanent health problems or death.

Glossary

Evaporate: To change from a liquid into a vapor or a gas.
Carcinogenic: Having the ability to cause cancer.
CAS: Chemical Abstracts Service.
ppm: Parts per million.
Solvent: A liquid that can dissolve other substances.

References

Agency for Toxic Substances and Disease Registry (ATSDR). 1995. Toxicological profile for xylenes (update). Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service.

Where can I get more information? For more information, contact the Agency for Toxic Substances and Disease Registry, Division of Toxicology, 1600 Clifton Road NE, Mailstop E-29, Atlanta, GA 30333. Phone:1-888-422-8737, FAX: 404-498-0093. ToxFAQs Internet address via WWW is http://www.atsdr.cdc.gov/toxfaq.html ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns.

APPENDIX B

WEST NILE VIRUS/ST. LOUIS ENCEPHALITIS PREVENTION

WEST NILE VIRUS/ST. LOUIS ENCEPHALITIS PREVENTION

The following section is based upon information provided by the CDC Division of Vector-Borne Infectious Diseases. Symptoms of West Nile Virus include fever, headache, and body aches, occasionally with skin rash and swollen lymph glands, with most infections being mild. More severe infection may be marked by headache, high fever, neck stiffness, stupor, disorientation, coma, tremors, convulsions, muscle weakness, paralysis, and, rarely, death. Most infections of St. Louis encephalitis are mild without apparent symptoms other than fever with headache. More severe infection is marked by headache, high fever, neck stiffness, stupor, disorientation, coma, tremors, occasional convulsions (especially infants) and spastic (but rarely flaccid) paralysis. The only way to avoid infection of West Nile Virus and St. Louis encephalitis is to avoid mosquito bites. To reduce the chance of mosquito contact:

- Stay indoors at dawn, dusk, and in the early evening.
- Wear long-sleeved shirts and long pants whenever you are outdoors.
- Spray clothing with repellents containing permethrin or DEET (N, N-diethyl-meta-toluamide), since mosquitoes may bite through thin clothing.
- Apply insect repellent sparingly to exposed skin. An effective repellent will contain 35% DEET. DEET in high concentrations (greater than 35%) provides no additional protection.
- Repellents may irritate the eyes and mouth.
- Whenever you use an insecticide or insect repellent, be sure to read and follow the manufacturer's directions for use, as printed on the product.

APPENDIX C
REPORT FORMS

WEEKLY SAFETY REPORT FORM

Week Ending: ______________ Project Name/Number: ______________________________

Report Date: ______________ Project Manager Name: ______________________________

Summary of any violations of procedures occurring that week: ______________________________

Summary of any job related injuries, illnesses, or near misses that week: ______________________________

Summary of air monitoring data that week (include and sample analyses, action levels exceeded, and actions taken):

Comments:

Name: ________________________ Company: ______________________________

Signature: ________________________ Title: ______________________________

INCIDENT REPORT FORM

Date of Report: ____________________

Injured: ____________________

Employer: ____________________

Site: ____________________ Site Location: ____________________

Report Prepared By: ____________________ ____________________

Signature Title

ACCIDENT/INCIDENT CATEGORY (check all that applies)

___Injury	___ Illness	___ Near Miss
__ Property Damage	___ Fire	___ Chemical Exposure
__ On-site Equipment	___ Motor Vehicle	___ Electrical
__ Mechanical	___ Spill	___ Other

DATE AND TIME OF ACCIDENT/INCIDENT: Narrative report of Accident/Incident: Identify: 1) actions leading to or contributing to the accident/incident; 2) the accident/incident occurrence; and 3) actions following the accident/incident.

____

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WITNESS TO ACCIDENT/INCIDENT:

Name ____________________ Company: ____________________

Address: ____________________

Phone No.: ____________________

Name ____________________ Company: ____________________

Address: ____________________

Phone No.: ____________________

INJURED - ILL:

Name: ____________________ SSN: ____

Address: ____________________ Age: ____

Length of Service: ____________________ Time on Present Job: ____________________________

Time/Classification: ____

SEVERITY OF INJURY OR ILLNESS:

____ Disabling ___ Non-disabling ___ Fatality

____ Medical Treatment ___ First Aid Only

ESTIMATED NUMBER OF DAYS AWAY FROM JOB: ______________________________

NATURE OF INJURY OR ILLNESS: ____

____

____

____

CLASSIFICATION OF INJURY:

__ Abrasions

__ Bites

__ Blisters

__ Bruises

__ Chemical Burns

__ Cold Exposure

__ Concussion

__ Lacerations

_____ Dislocations

_____ Faint/Dizziness

_____ Fractures

_____ Frostbite

_____ Heat Burns

_____ Heat Exhaustion

_____ Heat Stroke

____ Punctures

____ Radiation Burns

____ Respiratory Allergy

____ Sprains

____ Toxic Resp. Exposure

____ Toxic Ingestion

____ Dermal Allergy

Part of Body Affected: ____

Degree of Disability: ____

Date Medical Care was Received: ____

Where Medical Care was Received: ____

Address (if off-site): ____

(If two or more injuries, record on separate sheets)

PROPERTY DAMAGE:

Description of Damage: ______________________________

____

Cost of Damage: $ ______________________________

ACCIDENT/INCIDENT LOCATION: ______________________________

ACCIDENT/INCIDENT ANALYSIS: Causative agent most directly related to accident/incident (Object, substance, material, machinery, equipment, conditions)

____

____

____

____

Was weather a factor?: ______________________________

____

Unsafe mechanical/physical/environmental condition at time of accident/incident (Be specific):

____

____

____

Personal factors (Attitude, knowledge or skill, reaction time, fatigue):

____

____

ON-SITE ACCIDENTS/INCIDENTS:

Level of personal protection equipment required in Site Safety Plan:

____

____

Modifications:

____

Was injured using required equipment?:

____

____

If not, how did actual equipment use differ from plan?:

____

____

ACTION TAKEN TO PREVENT RECURRENCE: (Be specific. What has or will be done? When will it be done? Who is the responsible party to insure that the correction is made?

ACCIDENT/INCIDENT REPORT REVIEWED BY:

SSO Name Printed

SSO Signature

OTHERS PARTICIPATING IN INVESTIGATION:

Signature

Title

Signature

Title

Signature

Title

ACCIDENT/INCIDENT FOLLOW-UP: Date:

Outcome of accident/incident:

Physician's recommendations:

Date injured returned to work:

Follow-up performed by:

Signature

Title

ATTACH ANY ADDITIONAL INFORMATION TO THIS FORM

APPENDIX D
EMERGENCY HAND SIGNALS

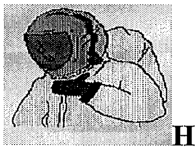
EMERGENCY SIGNALS

In most cases, field personnel will carry portable radios for communication. If this is the case, a transmission that indicates an emergency will take priority over all other transmissions. All other site radios will yield the frequency to the emergency transmissions.

Where radio communications is not available, the following air-horn and/or hand signals will be used:

EMERGENCY HAND SIGNALS

OUT OF AIR, CAN'T BREATH!

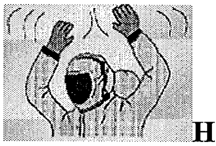


Hand gripping throat

LEAVE AREA IMMEDIATELY, NO DEBATE!

(No Picture) Grip partner's wrist or place both hands around waist

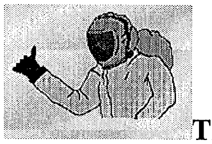
NEED ASSISTANCE!



Hands on top of head

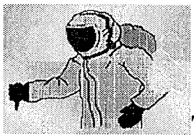
OKAY! – I'M ALL RIGHT!

- I UNDERSTAND!



Thumbs up

NO! - NEGATIVE!



Thumbs down

APPENDIX B
RESUMES OF KEY PERSONNEL

MICHELLE LAPIN, P.E.

SENIOR VICE PRESIDENT

Michelle Lapin is a professional engineer with more than 18 years of experience in the assessment and remediation of hazardous waste issues. She leads the firm's hazardous materials group and offers over a decade of experience providing strategic planning and management for clients.

As a project manager, Ms. Lapin has been responsible for the administration of technical solutions to contaminated soil, groundwater, and geotechnical problems. Her other project management duties have included technical and report review, proposal writing, scheduling, budgeting, and acting as liaison between clients and regulatory agencies, and project coordination with federal, state, and local authorities.

Ms. Lapin's hydrogeologic experience includes performing groundwater supply investigations, drilling supervision, and formulation and administration of groundwater monitoring programs in Connecticut, New York, New Jersey, New Hampshire, Massachusetts, Rhode Island, Virginia, and Maryland. Her experience with groundwater contamination includes Level B hazardous waste site investigations; execution of leaking underground storage tank studies, including hazardous soil removal and disposal; soil and water sampling; soil gas surveys; wetlands issues. Ms. Lapin is experienced in coordinating and monitoring field programs concerning hazardous waste cell closures. She has performed numerous Phase I, Phase II, and Phase III investigations, many of them in conjunction with large lending institutions, developers, and national retail chains. She is also experienced in submitting and conducting Voluntary Cleanup Agreement work plans with NYSDEC and brownfield redevelopments.

BACKGROUND

Education

B.S., Civil Engineering, Clarkson University
M.S., Civil Engineering, Syracuse University

Professional Registrations

State of New York, P.E.
State of Connecticut, P.E.

Professional Memberships

Member, American Society of Professional Engineers (ASPE), National and CT Chapters
Member, American Society of Civil Engineers (ASCE), National and CT Chapters
Member, Connecticut Business & Industry Association (CBIA), CBIA Environmental Policies Council

RELEVANT EXPERIENCE

Albert Einstein College of Medicine Center for Genetic and Translational Medicine, Bronx, NY

Ms. Lapin directed the firm's hazardous materials work in connection with the construction a new Center for Genetics and Translational Medicine (CGTM) building on the Bronx campus of the Albert Einstein College of Medicine of Yeshiva University. The building is expected to be opened by 2006. AKRF prepared an Environmental Assessment Statement (EAS) that examined such issues as land use, zoning, air quality, urban design and visual resources, hazardous materials, traffic, noise, and air quality. Ms. Lapin's work included analysis of the existing conditions and potential impacts that the construction could cause to the environment and human health.

Hudson River Park, New York, NY

Ms. Lapin is directing AKRF's hazardous materials work during construction of Hudson River Park, a 5-mile linear park along Manhattan's West Side. As the Hudson River Park Trust's (HRPT's) environmental consultant, AKRF is overseeing preparation and implementation of additional soil and groundwater investigations (working with both NYSDEC and NYCDEP), all health and safety activities, removal of both known underground storage tanks and those encountered during construction. Previously, the firm performed hazardous materials assessments as part of the EIS process, including extensive database and historical research, as well as soil and groundwater investigations. Ms. Lapin has been the senior consultant for the soil and groundwater investigations and remediation, and the asbestos investigations and abatement oversight.

Columbia University Manhattanville Campus EIS, New York, NY

Ms. Lapin is serving as hazardous materials task leader on this EIS for approximately 4 million square feet of new academic, research and neighborhood uses to be constructed north of Columbia University's existing Morningside campus. The work has included Phase I Environmental Site Assessments for the properties within the site boundaries and estimates for upcoming investigation and remediation.

Yonkers Waterfront Redevelopment Project, Yonkers, NY

For this redevelopment along Yonkers Hudson River waterfront, Ms. Lapin headed the remedial investigation and remediation work that included Phase I assessments of 12 parcels, investigations of underground storage tank removals and associated soil remediation, remedial alternatives reports, and remedial work plans for multiple parcels. Several of the city-owned parcels were remediated under a Voluntary Cleanup Agreement; others were administered with state Brownfields grants. Hazardous waste remediation was completed on both brownfield and voluntary clean-up parcels, and construction is underway for mixed-use retail, residential development, and parking.

Davids Island, New Rochelle, NY

Ms. Lapin managed the investigation of the former Army base for Westchester County. The island is planned for county park purposes. The investigation included a Phase I site assessment, with historical research going back to the 17th century, a subsurface investigation, underground storage tank investigation, and asbestos surveys of all remaining structures. Cost estimates were submitted to the County for soil remediation, asbestos abatement, and building demolition. Funding sources are currently being sought.

Site Selection and Installation of 11 Turbine Generators, New York and Long Island, NY

AKRF was retained by the New York Power Authority (NYPA) to assist in the State Environmental Quality Review Act (SEQRA) review of the proposed siting, construction, and operation of 11 single-cycle gas turbine generators in the New York metropolitan area. Ms. Lapin managed the hazardous materials investigation of the sites. The work has included Phase I site assessments, subsurface investigations, and construction health and safety plans.

Cross Westchester (I-287) Expressway Phases V and VI, Westchester County, NY

For the New York State Department of Transportation (NYSDOT), Ms. Lapin served as project manager and was responsible for directing the contaminated materials aspect of the final design effort for the reconstruction of Westchester County's major east-west artery. As part of her duties, Ms. Lapin was responsible for managing the asbestos investigations at eight bridges and wetland delineation along the entire corridor, as well as writing the scope of work and general management of the project.

Shaw's Supermarket, New Fairfield, CT

AKRF is providing consulting services to the developer and owner of a 9-acre site included conducting a remedial investigation and remediation of a site contaminated from former dry cleaning operations and off-site gasoline spills. The investigation included the installation of monitoring wells in three distinct aquifers, geophysical logging, pump tests, and associated data analysis. Ms. Lapin presented the environmental issues and planned remediation to local and state officials during the early stages of the planning process to incorporate their comments into the final remedial design. A remedial action work plan (RAWP) was completed and approved by the Connecticut Department of Environmental Protection within a year to enable redevelopment work for a new supermarket and shopping center. The RAWP included the remediation of soils within the source area and a multi-well pump and treat system for the recovery of non-aqueous and dissolved phase contamination in groundwater. The design of the recovery well system included extensive groundwater modeling to ensure capture of the contaminant plume and the appropriate quantity and spacing of the wells. Ms. Lapin directed the soil removal remedial activities and monitoring for additional potential contamination during construction. In addition, AKRF performed comprehensive pre-demolition asbestos and lead-based paint surveys of the former site structures, and are continuing to provide environmental consulting support for the development of the site. Site development has been completed and a groundwater remediation system was installed during site development. The remediation system is successfully operating. The next phase of work includes and off-site study to determine whether the contamination plume has migrated from the site since area residents use groundwater as a source of drinking water. Ms. Lapin will continue to manage the project through the study and remediation phases.

East 75th/East 76th Street Site, New York, NY

Ms. Lapin served as senior manager for this project that encompassed coordination and direct remediation efforts of this former dry cleaning facility and parking garage prior to the sale of the property and its ultimate redevelopment for use as a private school. A preliminary site investigation identified 20 current and former petroleum and solvent tanks on the property. A soil and groundwater testing program was designed and implemented to identify the presence and extent of contamination resulting from potential tank spills. This investigation confirmed the presence of subsurface petroleum contamination in the soil and solvent contamination from former dry cleaning activities in the bedrock. AKRF completed oversight of the remediation under the State's Voluntary Cleanup Program. Remediation, consisting of tank removals and excavation of contaminated soil and the removal of solvent-contaminated bedrock down to 30 feet below grade, has been completed. AKRF completed oversight of the pre-treatment of groundwater prior to discharge to the municipal sewer system and is currently completing an off-site study to determine impacts to groundwater in downgradient locations.

Former Macy's Site, White Plains, NY

Ms. Lapin managed the pre-demolition work for Tishman Speyer. Work included a Phase I site assessment; subsurface investigation (Phase II), including the analysis of soil and groundwater samples for contamination; a comprehensive asbestos, lead paint, and PCB investigation; radon analysis; and coordination and oversight of the removal of hazardous materials left within the building from previous tenants. Work also included asbestos abatement specifications and specifications for the removal of two 10,000-gallon vaulted fuel-oil underground storage tanks.

Storage Deluxe, Various Locations, NY

Ms. Lapin manages the firm's ongoing work with Storage Deluxe, which includes Phase I and Phase II subsurface investigations, underground storage tank removals and associated remediation, asbestos surveys and abatement oversight, and contaminated soil removal and remediation for multiple sites in the Bronx, Brooklyn, Manhattan, Westchester County, and Long Island.

Home Depot, Various Locations, NY

Ms. Lapin, serving as either project manager or senior manager, has managed the investigations and remediation at multiple Home Depot sites in the five boroughs, Long Island, and Connecticut. The investigations have included Phase I and II site assessments, asbestos and lead paint surveys, abatement specifications and oversight, and soil and groundwater remediation.

Avalon on the Sound, New Rochelle, NY

For Avalon Bay Communities, Ms. Lapin is managing the investigations and remediation of two phases of this residential development, including two luxury residential towers and an associated parking garage. Remediation of the first phase of development (the first residential tower and the parking garage) included gasoline contamination from a former taxi facility, fuel oil contamination from multiple residential underground storage tanks, and chemical contamination from former on-site manufacturing facilities. The remediation and closure of the tank spills was coordinated with the New York State Department of Environmental Conservation (NYSDEC). The initial investigation of the Phase II development—an additional high-rise luxury residential building—detected petroleum contamination. A second investigation was conducted to delineate the extent of the contamination and estimate the costs for remediation. The remediation will be conducted in conjunction with the development plan.

Mill Basin, Gerritsen Inlet, and Paerdegat Basin Bridges, Final Design, Shore Parkway, Brooklyn, NY

Following the preparation of the GEIS for the Belt Parkway Bridges Project, the firm was retained for supplemental work during the final design phase of the project. This included NEPA and SEQRA documentation for three of the bridges—Mill Basin, Gerritsen Inlet, and Paerdegat Basin—which will be federally funded. Ms. Lapin managed the contaminated materials investigation that included a detailed subsurface contaminated materials assessment, both subaqueous and along the upland approaches.

NYSDOT Transportation Management Center (TMC), Hawthorne, NY

AKRF conducted environmental studies for the NYSDOT at the current troopers headquarters in Hawthorne, NY. The property is the proposed site of a new Transportation Management Center. AKRF completed a comprehensive asbestos survey of the on-site building and prepared asbestos abatement specifications; performed a Phase I site assessment; conducted an eletromagnetic (EM) survey that located two fuel oil underground storage tanks, and developed removal specifications for the two underground storage tanks and an aboveground storage tank.

Metro-North Poughkeepsie Intermodal Station and Parking Improvement Project, Poughkeepsie, NY

Ms. Lapin served as project manager of the hazardous materials investigation in connection with AKRF's provision of planning and environmental services for parking improvement projects at this station along the Hudson Line. The project included an approximately 600-space garage, additional surface parking, and an intermodal station to facilitate bus, taxi, and kiss-and-ride movements. Ms. Lapin conducted Phase I and II contaminated materials assessments and worked with the archaeologists to locate an historical roundhouse/turntable.

Metro-North Golden's Bridge, Westchester County, New York

For Metro-North Railroad, Ms. Lapin managed a Phase I Environmental Site Assessment of a property that has since become the new parking area, used by the existing Golden's Bridge train station. Ms. Lapin also conducted a subsurface (Phase II) investigation of the original parking area, track area, and existing platform for the potential impact of moving tracks in the siding area to extend the existing parking area and adding an access from a proposed overhead walkway (connecting the train station to the new parking area). The study also included an assessment for lead-based paint and asbestos on the platform structures.

KATHLEEN BRUNNER

ENVIRONMENTAL SCIENTIST

Ms. Brunner is an environmental scientist with more than eight years of professional environmental consulting experience. She specializes in environmental site assessments and investigations, site remediation, and hazardous materials planning studies. Ms. Brunner directs and oversees site remediation projects, performs Phase I and II environmental site assessments, and is responsible for hazardous materials aspects of environmental impact statements (EISs).

Ms. Brunner's field work experience includes supervising the installation of soil borings and groundwater monitoring wells; sampling soil, groundwater, air and soil gas; maintaining and sampling groundwater remediation systems, and overseeing and directing construction-related soil management plans and environmental remediation projects. Her range of project experience includes preparation of proposals, sampling protocols, work plans, health and safety plans, site investigation reports, and closure requests, as well as project scheduling and budgeting. Ms. Brunner has coordinating work and acting as a liaison between clients, property owners, subcontractors, and regulatory agencies.

Prior to joining AKRF, Ms. Brunner worked for a multidisciplinary consulting firm at their offices in Pewaukee, Wisconsin and New York, New York as an environmental scientist.

BACKGROUND

Education

B.A., Physical Geography, University of Wisconsin – Milwaukee

Certifications

40-Hr Hazardous Waste Operations Site Worker

New York State Certified Asbestos Inspector

RELEVANT EXPERIENCE

CE Flushing Site, Flushing, NY

Ms. Brunner is managing and coordinating the investigation and remediation of a former industrial site in Flushing, Queens, NY as part of redevelopment of the property. The investigation and interim remedial measures included groundwater sampling, delineation of known areas of soil contamination, and delineating PCB-containing non-aqueous phase liquid (NAPL). Planned IRMs include the removal of aboveground and underground storage tanks, excavation of delineated hot spots, NAPL product removal, and sampling and investigation of on-site drainage structures.

Atlantic Yards Arena, Brooklyn, NY

As part of the New York City CEQR process, Ms. Brunner is serving on a team of Hazmat staff conducting Phase I Environmental Site Assessments in accordance with ASTM E-1527-00 related to the potential development of up to 8 city blocks for the Atlantic Yards Arena. As part of the study, Ms. Brunner coordinates with the client, property owners or their representatives, and tenants. Her work scope also includes site reconnaissance, site history and records review, interviews, report preparation and recommendations.

Bayside Fuel Oil Depot, Brooklyn, NY

Ms. Brunner is assisted in the preparation of the application for this site to participate in the New York State Department of Environmental Conservation's (NYSDEC) Brownfields Cleanup Program. As part of this project, Ms. Brunner is responsible for developing a work plan for approval by the NYSDEC and preparation of summary reports for public comment. Ms. Brunner will be arranging and overseeing the subsurface investigation and preparation of investigation reports.

Fulton Street Transit Center, New York, NY

While with another firm, Ms. Brunner worked with a multi-company project team assisting with work pertaining to subsurface environmental issues. Ms. Brunner provided general environmental oversight of soil borings, collected groundwater samples from wells, conducted rising head slug tests, and calculated hydraulic conductivity estimates. She prepared the Health and Safety Plan, environmental portions of the work plan, and the Environmental Subsurface Investigation Plan.

DaimlerChrysler, Kenosha, WI

While with another firm, Ms. Brunner assisted in multiple phases of work at an approximately 100-acre DaimlerChrysler manufacturing facility. During construction of a new building, Ms. Brunner observed excavation activities and sampled contaminated soils for waste characterization analyses associated with spoils from construction activities. Ms. Brunner directed and documented contaminated soil excavation and dewatering treatment activities. Post-construction, Ms. Brunner assisted in the reconstruction of two pump-and-treat remediation systems and an SVE system, including plumbing an oil water separator and stripper, and installing appropriate venting and sampling ports. Ms. Brunner also assisted in equipment start-up and subsequent troubleshooting and sampling of influent and effluent. On a quarterly basis, routine and troubleshooting maintenance work was performed on the pumps, flow meters, strippers, oil/water separators and other system components for six remediation systems. Ms. Brunner directed and documented monitoring well installation, collected groundwater samples from up to 50 monitoring wells and sumps, and air samples from soil vapor extraction systems, reviewed and summarized field and laboratory data, and assisted in writing semi-annual and annual reports for this facility. Reporting included quality assurance calculations, determination of quantity of free product and dissolved phase contaminant removal, and project narrative of activities completed during the reporting period.

ANDREW D. RUDKO, PH.D.

SENIOR VICE PRESIDENT

Andrew D. Rudko, Ph.D., is a senior vice president of AKRF, with more than 25 years of experience in environmental analysis and management, with particular emphasis on hazardous materials, environmental site assessments and audits, and soil and groundwater remediation. Dr. Rudko's current and recent experience includes management of several projects involving Voluntary Cleanup Agreements for assessment and remediation of soil and groundwater contamination problems on major development sites. He directed Phase I environmental assessments for several major commercial properties in the New York City area, including the AT&T building, the Plaza Hotel, One Seaport Plaza, New York Plaza, the former General Electric building, the site of the proposed Trump Riverside South development, and many others.

In addition, he also directed Phase I environmental assessments of **several major medical facilities** in connection with new financing through bonds issued by the New York State Medical Care Facilities Finance Agency. Facilities include Presbyterian Hospital, Mt. Sinai Medical Center, St. Lukes/Roosevelt Hospital Center, Brooklyn Hospital, and Syosset Hospital.

Dr. Rudko has managed cleanups of many **petroleum spills on sites in New York City**. Some recent spill cleanup sites include the Tribeca Hotel site developed by Hartz Mountain Industries in Lower Manhattan, retail sites in Maspeth and Long Island City developed by Forest City Ratner Companies, a site in the Bronx developed by Triangle Equities for the Department of Motor Vehicles, the Rivergate Apartments on East 34th Street in Manhattan, the Tate apartment building on West 23rd Street in Manhattan, and a residential development on Sixth Avenue and 26th Street in Manhattan.

He has been responsible for assessing **impacts on public health** for a number of projects involving the use of hazardous chemicals, biohazards, and radioactive materials. These projects include an engineering and physics research center on the campus of Columbia University, a new laboratory building for biomedical research at Rockefeller University, a new research center for Memorial Sloan Kettering Medical Center and the Audubon Research Park in upper Manhattan.

Dr. Rudko's experience includes several projects involving **the environmental impacts of solid waste disposal facilities**. He designed and managed a testing program to determine whether toxic pollutants were being emitted into the atmosphere from the 2,900-acre Fresh Kills Landfill on Staten Island. He also participated in studies of the environmental impacts of various proposals to dispose of New York City sewage sludge, and of several proposed resource recovery facilities.

Previously, Dr. Rudko was a senior environmental scientist at Parsons Brinckerhoff Quade and Douglas, Inc. He was responsible for environmental analyses for a variety of development, transportation, and solid waste disposal projects throughout the country. These included projects in New York, New Jersey, Maryland, Virginia, Washington, D.C., and Florida.

BACKGROUND

Education

B.S., Biochemistry, Cornell University
Ph.D., Biochemistry, Columbia University

RELEVANT EXPERIENCE

Medical Facilities

Medical Care Facilities Finance Agency (MCFFA), New York, NY
Dr. Rudko directed Phase I environmental assessments of several major medical facilities in connection with new financing through bonds issued by MCFFA. Facilities include Presbyterian Hospital, Mt. Sinai Medical Center, St. Lukes/Roosevelt Hospital Center, Brooklyn Hospital, and Syosset Hospital. The firm performed preliminary investigations, including Phase I site assessments, and Phase II assessments if necessary. The firm identified potential environmental liabilities and suggested remediation. For example, for the New York Presbyterian Hospital, AKRF identified several underground tanks remaining on the site, then designed and implemented a remediation plan. For the Syosset Hospital on Long Island, AKRF identified floor drains in basement areas that discharged into old dry wells as a potential environmental liability.

Audubon Research Park, New York, NY
Dr. Rudko directed the hazardous materials assessment for the EIS for a 5.5-acre development that includes the Mary Woodard Lasker Biomedical Research Building, which houses the Audubon Business and Technology Center, and the Russ Berrie Medical Science Pavilion. The Berrie Pavilion houses a community health facility, a comprehensive diabetes center, genetics research and a research program in pediatrics. The Irving Center will house research on cancer, genetics, and cell biology. Dr. Rudko led the analysis of medical waste disposal procedures and potential health concerns associated with chemicals used in the proposed research laboratories.

Memorial Sloan-Kettering Cancer Center (MSKCC), New York, NY
AKRF prepared a comprehensive EIS for the expansion of MSKCC, a state-of-the-art cancer treatment and research center located on the Upper East Side in Manhattan. Dr. Rudko directed the hazardous materials study, which included analyses of radioactive and toxic materials used in the cancer research and treatment facility

Mount Sinai School of Medicine, New York, NY
Dr. Rudko directed a hazardous materials assessment in connection with the EIS for a multi-use building for the Mount Sinai School of Medicine. The site, formerly used for parking, is on the east side of Madison Avenue between 98th and 99th Streets opposite the main portion of the Mount Sinai Medical Center. The 740,000-gross-square-foot structure will contain research labs, clinical labs, psychiatric care beds, administrative offices, an auditorium, a seminar room, a cafeteria, faculty offices, a vivarium, and approximately 300 accessory parking spaces.

Columbia University Center for Engineering and Physical Science Research, New York, NY
Dr. Rudko directed the preparation of an EIS for Columbia University's Center for Engineering and Physical Science Research, located on the south side of 120th Street in Manhattan. The project serves as a center for university, government, and industry partnership in high-technology research. The approximately 200,000-square-foot building contains an auditorium, seminar rooms, laboratories, and offices for research activities in four general areas: telecommunications, microelectronics and electronic materials, intelligent systems and robotics, and parallel and distributed computer systems. In addition, a new central boiler facility and power plant for the campus are located in the lower level of the new building.

Rockefeller University, New York, NY

Dr. Rudko led the analysis of hazardous materials for an Environmental Assessment Statement (EAS) and supplemental studies in connection with a new laboratory building. The proposed building would include approximately chemistry and biomedical research laboratories, an auditorium, office and meeting space, underground parking for approximately 180 cars, a glass wash facility, and truck loading and receiving space.

Significant issues for environmental review included hazardous materials and air quality, including the potential effects of a spill within a laboratory on pollutant levels at adjacent buildings and receptor locations.

General Experience

Gowanus Canal, Brooklyn, NY
Dr. Rudko managed the investigation and remedial design of a former manufactured gas plant site on the Gowanus Canal in Brooklyn. The subsurface remains of three large gasholders filled with coal tar-contaminated soil and debris were cleaned up prior to development of the property.

Home Depot, New Rochelle, NY
Dr. Rudko directed the assessment and remediation work on a 14-acre parcel in New Rochelle, New York that was being developed by Home Depot USA. After extensive review and discussions with the New York State Department of Environmental Conservation (DEC), a remediation agreement was developed and approved that became the model for New York State's Voluntary Cleanup Program. AKRF supervised the implementation of the remediation measures, which included removal of underground storage tanks and associated contaminated soil, and construction of an impermeable cap with a gas venting system for areas with lead contamination.

Home Depot, Rego Park, NY
On another retail site, serious solvent contamination was unexpectedly encountered on a property being developed in Queens, New York. Dr. Rudko managed the design and execution of a testing program, planned a remediation program that would permit development of the site, and assisted in the negotiation of a Voluntary Cleanup Agreement with DEC. Development of the property is now continuing while a groundwater remediation system designed by AKRF's Engineering division is installed as part of the building construction.

PCB-Contaminated Site, College Point, NY
Dr. Rudko directed a Voluntary Cleanup involving the delineation and removal of PCB-contaminated soil from a site in College Point. DEC issued a release letter following the successful completion of this project.

Queens West Development Project, Queens, NY
Dr. Rudko directed the site assessment work on the 90-acre site of the proposed Queens West development project being sponsored by the Empire State Development Corporation, the New York City Public Development Corporation, and the Port Authority of New York and New Jersey. This site comprises more than 10 blocks of industrial property along the East River in Queens. Former uses on the site include oil refineries, paint manufacturers, and railyards. AKRF developed and implemented extensive soil and groundwater testing programs, and developed remediation plans which have been incorporated into four separate Voluntary Cleanup Agreements.

Laundry/Dry Cleaning Plant, New York, NY
Dr. Rudko has been managing the assessment and cleanup of the only listed hazardous waste site in Manhattan, a former laundry/dry cleaning plant on Fifth Avenue in Harlem. Remediation has included the removal of contaminated building materials and operation of an innovative sub-slab vapor extraction system. Installation of this system required the development of special techniques for horizontal drilling under the floor of the building.

Jamaica Water Company, Queens, NY
For the New York City Department of Environmental Protection, Dr. Rudko directed fast-track site assessments of 17 properties acquired from the Jamaica Water Company. The assessments, all of which were completed within 2 months, included soil and groundwater testing, asbestos and lead paint surveys, and testing of buildings for mercury contamination.

School Construction Authority, Various Locations, NY

Dr. Rudko was project director for the site assessment work the firm performed for the New York City School Construction Authority, directing assessments on school sites in the Bronx, Brooklyn, and Queens. Sites included a former gas station, a truck salvage yard, and a former plastics factory. Testing programs were recommended, developed, and implemented for these sites, and remedial actions were recommended where necessary. At the former plastics factory site, the testing program included soil and groundwater sampling, testing of building floors for PCB contamination, and location and removal of old underground gasoline and oil tanks, with screening of surrounding soil for possible petroleum contamination.

Home Deport, Various Locations, NY

Dr. Rudko has been providing environmental consulting services to Home Depot, Inc. in connection with their development of major retail facilities at locations throughout the New York metropolitan area. Many of these locations are former industrial properties that have required remedial actions prior to redevelopment.

Costco, Inc., Various Locations, NY

Dr. Rudko has been providing environmental consulting services to Costco, Inc. in connection with their development of major retail facilities at locations throughout the New York metropolitan area. Many of these locations are former industrial properties that have required remedial actions prior to redevelopment.

New York Times, New York, NY

He directed Phase I and Phase II assessments for the New York Times in preparation for the development of its major new printing facility in New York City. Assessments were prepared for three alternative sites: a former railyard in the Bronx later used as an illegal landfill for demolition debris; a site in Queens comprising six industrial properties, several with multiple tenants; and a large city-owned site in Queens.